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AESO/SE
02-21-00-F-0303

January 28, 2004

Memorandum

To: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico

From: Field Supervisor, Arizona Ecological Services Field Office

Subject: Intra-Service Biological and Conference Opinion on Issuance of a 10(a)(1)(B) Incidental Take Permit to Exeter, LXI, L.L.C., in the Town of Marana, Pima County, Arizona

This biological and conference opinion responds to your request for consultation with the Arizona Ecological Services Office pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act). The Federal action under consideration is issuance of a permit authorizing incidental take under section 10(a)(1)(B) of the Act for proposed residential development within the 512-acre property known as Sky ranch (Sky ranch Project), in the Town of Marana, Pima County, Arizona. We have also received a request for consultation from the U.S. Army Corps of Engineers regarding the issuance of a Clean Water Act section 404 nationwide permit for the Sky ranch Project. Issuance of these permits may affect the federally endangered cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) (pygmy-owl). The U.S. Fish and Wildlife Service (FWS) will be the lead agency for this consultation.

In addition to the application for an incidental take permit (TE-063647-0), Exeter, LXI, L.L.C. (Exeter) submitted an Environmental Assessment/Habitat Conservation Plan (EA/HCP). The implementing regulations for section 10(a)(1)(B) of the Act, as provided for in 50 CFR 17.22, specify criteria by which a permit allowing incidental "take" of listed endangered species pursuant to otherwise lawful activities may be obtained. The issuance criteria require, in part, that the incidental taking from the proposed construction will be minimized and mitigated to the maximum extent practicable, and will not appreciably reduce the likelihood of survival and recovery of this federally listed endangered species in the wild.

This biological opinion addresses the potential impacts of the Sky ranch Project on the pygmy-owl and its proposed critical habitat and is based on information provided in the draft EA/HCP for the project, prepared by the applicant's consultant, Thomas Olsen Associates, Inc. (TOA); the final EA; a biological evaluation prepared by Westland Resources for the Army Corps of Engineers (ACOE); a number of correspondence and meetings among the project proponents, their consultant, the Arizona Game and Fish Department (AGFD), and the FWS; several

telephone conversations; correspondence from AGFD; and other sources of information. A complete administrative record of this consultation is on file at the FWS's Tucson Suboffice. We have assigned log number 02-21-00-F-303 to this project. Please refer to that number in future correspondence on this consultation.

Consultation History

- 6/21/2000 – Meeting that initiated discussions regarding this project among the applicant, TOA, and the FWS.
- 10/17/2000 – Meeting with applicant and TOA to discuss project concepts and appropriate process under the Act.
- 6/20/2001 – First draft of EA/HCP provided by TOA
- 2/18/2002 - Initial HCP application submitted by Exeter and TOA
- 12/5/2002 – Revised HCP application submitted by Exeter and TOA
- 12/16/2002 – Notice of availability and request for public comment published in the Federal Register with 60-day comment period.
- 2/16/2003 – Public comment period closed; five comments received.
- 11/16/2003 – Final draft EA/HCP and IA received from applicant and TOA
- 1/8/2004 - Request for consultation and biological evaluation received from the Army Corps of Engineers
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BIOLOGICAL OPINION

I. DESCRIPTION OF PROPOSED ACTION

Exeter LXI, L.L.C. has applied to the U.S. Fish and Wildlife Service for an incidental take permit, pursuant to section 10(a)(1)(B) of the Act. The permit application is for the endangered pygmy-owl. The proposed action that would be covered by the permit is the development of 103 acres of pygmy-owl habitat within the 512-acre Sky ranch Property in the Town of Marana, Pima County, Arizona. The Sky ranch Project will consist of up to 440 production lots. The requested duration of the permit is 5 years. Incidental take under the permit would be authorized as follows:

During the life of this Permit, as long as the Sky ranch HCP is being properly implemented, the Permittee may, in carrying out the Permitted Activity, incidentally take within the Permit Area in the form of non-lethal harm or harassment, four non-breeding pygmy-owls as follows:

- Two (2) non breeding pygmy-owls the first year of construction
- One (1) non-breeding pygmy-owl the second year of construction
- One (1) non-breeding pygmy-owl the last 2 years of construction and for the remainder of the permit.

The above-anticipated take is not cumulative, but instead, what is likely to occur in the specific year or years identified above. Thus, for example, if two dispersing owls are not detected on the Property the first year, the Applicant will not be covered for any additional take other than what is stated above for subsequent years.

Exeter has developed the EA/HCP, in which they proposed to minimize and mitigate impacts from any expected incidental take of the pygmy-owl that may result from the proposed action. The EA/HCP also analyzes the effects of the proposed action on the human environment. The preferred alternative is issuance of an incidental take permit to allow the development and operation of the Skyranch Project in conjunction with the implementation of the EA/HCP and Implementing Agreement (IA). A Biological Evaluation (BE) was developed to address the aspects of the Skyranch Project involving off-site utilities

The EA/HCP and BE fully describe both the location and design of the Skyranch Project. The proposed action is the issuance of the permit in accordance with the Preferred Alternative and Proposed Design. As a condition of the permit, Exeter will fully implement the EA/HCP and IA. Sections 1.0, 3.1, and 4.1 of the EA/HCP and Section 2 of the BE describe this proposed action in detail; pertinent information is summarized below.

Project Description

The Skyranch Project proposes residential development on 103 acres within the 512-acre Property. Development will be clustered to avoid the major wash areas and habitat connections. A total of 440 residential units will be constructed. Total ground disturbance within the Skyranch Property will not exceed 20%, unless circumstances occur as described in Section 7.2.1.1 of the HCP. Under such circumstances, Exeter could increase disturbance to 22% of the 512-acre Property. The remaining undisturbed open space (399 to 409 acres) will be conserved in a natural state as a pygmy-owl habitat reserve (Reserve). The Reserve will be managed as described below in order to maintain pygmy-owl habitat values. Activities associated with the residential development that will occur on-site include home construction, installation of access roads and utilities, construction of a water storage reservoir, and the creation of an educational center. Nine drainages have been identified within the Skyranch Property as being jurisdictional with regard to section 404 of the Clean Water Act. On-site activities will impact only one of these drainages where a single, culverted road crossing will occur. Total impact to jurisdictional waters of the U.S. will be less than one acre.

Development of the Skyranch Project will require the installation of some off-site utilities and minor roadway improvements for the safe ingress and egress to the property. The off-site utilities will include new water, electricity, natural gas, and sewer services. Project-specific

disturbance from dry utilities will likely be within the anticipated disturbance limits of the wet utilities.

The off-site utility service will be installed in the following areas:

- Along Tangerine Road from its intersection with Camino de Mañana to Thornydale Road (approximately 3000 linear feet extending up to 20 feet from the edge of existing pavement, on the south side);
- Along Thornydale Road south from the intersection with Tangerine Road to the southeastern development pod (approximately 2700 linear feet extending up to 12 feet from the edge of existing pavement, on the east side);
- Along Camino del Norte from the intersection with Camino de Oeste east (approximately 3300 linear feet extending across the existing 30-foot wide dirt road plus an additional 10 feet on the north side);
- Along Camino de Oeste from the intersection with Camino del Norte north (approximately 800 linear feet extending across the existing 30-foot wide dirt road); and
- Along Camino de Mañana from the property entrance northeast to the intersection with Tangerine Road (approximately 1400 linear feet extending up to 12 feet from the edge of the existing pavement, on the south side).

Off-site road improvements will be made at:

- The property access point on Thornydale Road, consisting of one acceleration and one deceleration lane on the west side of Thornydale Road;
- At the intersection of Camino de Mañana and Tangerine Roads, consisting of one deceleration lane on the south side of Tangerine Road; and
- Pavement overlay on Camino de Mañana.

The acceleration and deceleration lanes vary in length and width as they transition from the travel lanes to the independent turn lanes. Land disturbance areas associated with the three turn lanes are up to approximately 900 feet long (Tangerine acceleration lane) and generally extend up to 23 feet from the edge of existing pavement. No new land disturbance will result from the pavement overlay on Camino de Mañana. The total land disturbance for the off-site utility and roadwork is 6.035 acres. Within this area, only 1.12 acres will result in vegetation disturbance. Total disturbance within jurisdictional waters of the U.S. for the Skyranch Project is approximately 0.2 acre. The habitat impacts associated with the above off-site work was not addressed in the HCP, but was addressed in the ACOE's BE and request for section 7 consultation.

Proposed Mitigation

The EA/HCP describes the measures to minimize and mitigate adverse effects of any expected take. Exeter has committed to implementing the Skyranch HCP, including these measures.

These measures are included as terms and conditions of the incidental take permit. Exeter will implement a number of conservation measures as part of the EA/HCP in order to minimize and mitigate the anticipated loss of 103 acres of pygmy-owl habitat as a result of the implementation of the Skyranch Project. The conservation measures will also address the anticipated non-lethal take of 4 non-breeding pygmy-owls due to harm and harassment over a 4-year period of the 5-year permit. These conservation measures include establishment of a 409-acre reserve that will be conserved for the pygmy-owl in perpetuity (HCP 6.0). The Reserve will be established by 1) executing a conservation easement on 368 acres (90 %) of the reserve upon receipt of the incidental take permit, 2) executing a conservation easement on the remaining 41 acres of the reserve upon completion of the Skyranch Project, 3) selecting a land manager, 4) developing and implementing a land management plan, 5) establishing an endowment for management and monitoring of the Reserve and 6) erecting a fence around the Reserve. Management of the Reserve will include the following elements:

- Exeter, with the approval of the FWS, will develop a Reserve Management Plan (RMP). The Reserve management entity (and until the entity is selected, Exeter) will be responsible for implementing the RMP, including any adaptive management action. In addition, subject to the limitations stated herein, the Reserve management entity (and until the entity is selected, Exeter), as applicable, will cooperate with the FWS in the implementation of adaptive management actions (EA/HCP 6.0).
- Management objectives of the Reserve are, to the maximum extent practicable and subject to limitations on the commitment of resources (EA/HCP 6.0), to:
 - Maintain the Reserve's habitat in the naturally occurring conditions on-site at the time of acquisition; and
 - Protect the Reserve from damage or harm that may be caused by vandalism, motor vehicle use, livestock grazing, and free-roaming domestic animals.
- Only passive recreational activities will be allowed in the Reserve. Passive recreation includes public pedestrian and equestrian access to existing, undeveloped trails that transect the Reserve (EA/HCP 6.0).
- Equestrian use of the Reserve will be limited to common saddle stock (horses, mules, and donkeys). Access to the Reserve will be limited to passive recreational riding occurring on established trails. No saddle stock will be permitted off of established trails. No picketing or pasturage of saddle stock will be permitted on the Reserve at any time. All other forms of livestock will be strictly prohibited from the Reserve (EA/HCP 6.0).
- Exeter will require adherence to the RMP, which addresses acceptable and prohibited uses and management actions. Vegetation disturbance and other activities (e.g. ORV, motorbike use/racing, firearm target practicing, jeep tours, and application of insecticides and herbicides) that might significantly degrade pygmy-owl habitat shall be prohibited within the Reserve (EA/HCP 7.2.1.1).

Proposed Minimization Measures

- In the event that a pygmy-owl is detected on or adjacent to the Skyranch Project area during construction and establishes a territory or nest site, qualified biologists retained by Exeter, in conjunction with the FWS, will be called upon to assess the situation. If it is determined that the arriving pygmy-owl has established a territory, Exeter will temporarily avoid activities in the vicinity of the nest or activity center and confer with the FWS. A dispersing pygmy-owl that has been determined to occupy an area for 2 weeks or more shall be considered to have established a territory. The level of development activity in the vicinity of a new pygmy-owl territory or activity center will vary depending on the distance between the pygmy-owl site and the planned development. The presumed territory has been divided into four zones based upon the degree of proximity to the pygmy-owl site (EA/HCP 7.2.1.1).
 - **Zone 1** – 0-100 meters from the pygmy-owl activity center
 - There shall be no removal of active nest sites and no land clearing activity within a 100-meter (330 foot) radius of a currently occupied pygmy-owl nest or activity center at any time.
 - Construction-related activities may continue on lands that have already been cleared of vegetation provided that they do not exceed the levels/intensity of activity that was occurring during the period of time that the pygmy-owl territory was established.
 - Activities that would be more intense or cause greater levels of noise disturbance than were occurring during the period of time that the territory was established cannot proceed during the pygmy-owl breeding season (February 1 through July 31).
 - **Zone 2** – 100-400 meters from the pygmy-owl activity center
 - No additional clearing of vegetation will be permitted during the pygmy-owl breeding season (February 1 through July 30).
 - There are no restrictions on the nature or type of construction activity outside of the pygmy-owl breeding season (August 1 through January 31) provided it is consistent with the approved HCP and IA.
 - Construction activities during the pygmy-owl breeding season (February 1 to July 31) cannot exceed the levels or intensity of activity that occurred at the time the pygmy-owl territory was established.
 - **Zone 3** – 400 to 600 meters from the pygmy-owl activity center
 - No additional clearing of vegetation will be permitted during the pygmy-owl breeding season (February 1 through July 31) without FWS approval.
 - There are no restrictions on the levels or intensity of construction activity (excluding the clearing of vegetation) at any time of the year provided it is

consistent with the approved HCP and IA.

- **Zone 4** – Greater than 600 meters from the pygmy-owl activity center
 - No restrictions. Any activity consistent with the Project description provided in the EA/HCP and the approved IA is allowed.
- The WS, in coordination with AGFD and Exeter's Environmental Consultant, will determine whether a pygmy-owl activity center or nest site exists and whether a change in status (i.e., abandonment) is appropriate, using the best available information, including survey detection and telemetry data (if available), and other monitoring information (EA/HCP 7.2.1.1).
- In addition to the above, in the event that a pair of pygmy-owls establishes a breeding territory within 100 meters of an area on the Skyranch Project scheduled for construction, a 280-acre home range will be designated. This 280-acre home range will be circular with the centroid being the nest or activity center. Because construction may need to be redesigned to accommodate a breeding pair of owls, Exeter will be allowed to increase construction by one and one-half acres for every one-acre that needs to be adjusted. Development within the Property boundary may not exceed 22 % (EA/HCP 7.2.1.1).
- Only directional and low-intensity lights will be used within 100 meters (330 feet) of a new nest site or activity center to minimize potential adverse effects to resident pygmy-owls (EA/HCP 7.2.1.1).
- Land clearing, heavy equipment operation, and all other construction-related activities will be limited to the Skyranch Project area. No construction-related activities, personnel, or equipment will be allowed into the Reserve (EA/HCP 7.2.1.1).
- Silt fence will be installed and maintained around the perimeter of the Skyranch Project area in order to delineate the approved construction boundaries (EA/HCP 7.2.1.1).
- Exeter will develop and implement a Public Outreach program. The information will be distributed to potential homebuyers, neighbors, and other interested parties. The informational package will include a basic description of the conservation goals of the HCP/Incidental Take Permit (ITP), emphasizing measures taken to protect the pygmy-owl. A copy of this informational brochure is found in Appendix C of the EA/HCP (EA/HCP 6.0).
- Exeter will develop an educational program, with FWS approval, to provide construction personnel and future residents of the Skyranch Project with information regarding the pygmy-owl, long-term preservation, and limits to use of the Reserve. All construction management personnel will be required to attend an environmental training session conducted by TOA, or a similarly qualified entity, prior to their participation in construction activities. This educational program will inform construction personnel of the following (EA/HCP 6.0):

- The Endangered Species Act
 - Pygmy-owl ecology and regulatory status
 - The conservation goals of the HCP
 - The terms and conditions of the ITP
 - Actions to minimize and mitigate impacts
 - Development and reserve area boundaries
 - Specific limitations on construction activities on the Property
 - Prohibited activities
 - Reporting recommendations and requirements
- Exeter will implement a Residential Development Landscape Theme for the Skyranch Project to maintain a desert theme, incorporating plant materials indigenous to, and blending in with, the Sonoran desert (EA/HCP 7.2.1.1).
 - Exeter will commission a Native Plant Salvage Plan. This plan will conform to all applicable State, county, and local regulations (EA/HCP 7.2.2).
 - If practicable, saguaros will be preserved in place. If it is not practicable to preserve saguaros in place and if the saguaro is salvageable, it will be transplanted to an appropriate location. Exeter will make every reasonable effort to preserve saguaros in place. The FWS will be notified prior to the removal of saguaros and potential nest trees and given the opportunity to inspect them prior to removal. The FWS will have 15 days subsequent to notification to conduct their inspection. All FWS inspections will be conducted in the presence of a qualified biologist retained by Exeter (EA/HCP 7.4).
 - Within the Skyranch Project area, if salvage of a saguaro is not practicable, construction activities may proceed and can include destruction of saguaros, provided that they are inspected and determined to not be in current use for pygmy-owl nesting. If a saguaro must be destroyed, Exeter will plant three saguaros (minimum of 12 feet tall) as replacements (EA/HCP 7.2).
 - Within the Skyranch Project area, if inspected trees or saguaros are not being used for nesting by pygmy-owls, construction may proceed. Following inspections with negative results (no pygmy-owl detection), Exeter will require the developer and/or lot owner to cover the inspected cavities with wire mesh or other appropriate material to preclude use of the cavities by pygmy-owls until grading and construction activities have ceased. All cover material will be removed at the completion of building activities. Materials used to cover cavities will be placed in a manner that does not injure the plant (EA/HCP 7.2).
 - Cavity inspection requirements will only apply to construction that is commenced during the pygmy-owl nesting period. No cavity inspection will be required for construction commenced outside of the pygmy-owl nesting period (EA/HCP 7.3).
 - Natural buffers will be maintained along all roadways abutting and within the Property

(EA/HCP 7.2.1.1).

- Natural buffers will be maintained along the perimeter of the development pods and lot lines adjacent to the Reserve, maximizing the conservation value of the Reserve (EA/HCP 7.2.1.1).
- Pet restrictions will be put in place for all residences in the Skyranch Project as homeowner resolutions in order to guard against possible mortality to pygmy-owls, their prey species, and other wildlife. Dogs will be kept under control or leashed at all times. Residents of the Skyranch Project will be strictly prohibited from keeping free roaming cats (EA/HCP 7.2.1.1)

Proposed Surveys

- Exeter will conduct surveys (using the FWS approved survey protocol in effect at the time of such activity) prior to initiating, salvaging, clearing, or construction activities in all suitable pygmy-owl habitat on the Property. If vegetation disturbance activities within the Skyranch Project area have not been completed prior to January 1 of any given year, pygmy-owl surveys will be conducted the following survey season according to protocol (HCP 7.2.1.1).
- Exeter will conduct annual surveys on the entire Property using current survey protocol during the 5-year term of this HCP corresponding to the construction phase of the Skyranch Project. Exeter will be responsible for funding these surveys. Personnel will conduct all surveys with appropriate survey permits from the FWS. Should any pygmy-owl be detected during these surveys, Exeter will notify the FWS as required under the conditions of the Surveyor's permit to conduct the survey (EA/HCP 7.3).
- After its selection, the Reserve management entity shall be solely responsible for the surveying, monitoring, and reporting requirements of the HCP applicable to the Reserve. (EA/HCP 7.3).

Proposed Monitoring

- Exeter will employ Environmental Compliance Monitors (ECMs) during construction in order to ensure compliance with the terms and conditions of this HCP and the ITP (HCP 7.2.1.1). ECMs will be present on the Skyranch Project area during the clearing, grading, and construction phases of the Skyranch Project. These ECMs will have the authority to ensure that the Skyranch Project is executed in compliance with all environmental regulations and permit conditions. Specific responsibilities of the ECMs will include, but not be limited to the following (HCP 7.2.3):
 - Ensure that all construction management personnel have attended the environmental training session;

- Prevent any unauthorized encroachment into the Reserve;
 - Monitor all construction activities;
 - Provide relevant biological information and assistance to construction personnel; and
 - Report any instances of non-compliance with environmental regulations.
- Should a pygmy-owl be detected on-site during annual surveys, a more in-depth monitoring effort may be implemented at the FWS's discretion. Prior to initiating these surveys, the FWS will coordinate with Exeter to ensure that there is no conflict between the telemetry protocol and Exeter's activities on the Property. Exeter will fund this telemetry effort at up to \$1,000 per bird for up to five birds. The total potential maximum commitment of funds by Exeter for follow-up survey/telemetry is a total of \$5,000. All telemetry activities within the Property will be conducted in the presence of a qualified biologist retained by Exeter. Exeter's obligation to fund telemetry studies will cease within one year of completion of build-out, or upon the expiration date of the ITP, whichever occurs first. On a confidential basis, a copy of the telemetry results will be provided to Exeter. Exeter will not release this information to the public or otherwise make it available without the prior written consent of the FWS. Exeter's responsibility for funding telemetry studies is triggered by pygmy-owl detection on or immediately adjacent (within 600 meters) to the Property (EA/HCP 7.3).
- If it is determined that a pygmy-owl has established an active breeding territory on the Property, Exeter will provide funding for Arizona Game and Fish Department (AGFD) to intensively monitor the activities of the breeding pair. Exeter will provide up to \$15,000 for this effort. It is hoped this intensive monitoring will provide the scientific community with valuable information regarding pygmy-owl breeding productivity, foraging ecology, habitat use, and time activity budgets. It is anticipated that the collection and analysis of this information will aid in the conservation and recovery of pygmy-owls. All monitoring activities within the Property will be conducted in cooperation with a biological consultant retained by Exeter. On a confidential basis, a copy of the monitoring results will be provided to Exeter. Exeter will not release this information to the public or otherwise make it available without the prior written consent of the FWS. Exeter's responsibility for funding intensive monitoring studies is triggered by the detection of an active pygmy-owl breeding territory on the Property. Exeter's obligation to fund monitoring studies will cease within one year of completion of build-out, or upon the expiration date of the ITP, whichever occurs first (EA/HCP 7.3)

Proposed funding

- Exeter will establish an endowment for the operation, management, and monitoring of the Reserve. Sufficient funding will be provided to establish and manage the Reserve, as well as provide the construction safeguards around those portions of the Reserve where Sky ranch Project development will occur (EA/HCP 6.0; EA/HCP 7.5).
- The duration of the ITP is 5 years. Exeter will provide funds necessary to manage the Reserve and implement the HCP in perpetuity. Until the Reserve management entity is

selected and a RMP is adopted pursuant to the HCP and IA, Exeter will provide such funds on an annual basis. As part of its yearly budget cycle, Exeter will estimate the costs of projects and programs called for in the HCP. The FWS will review annual activities and budget estimates. Funding allocations will be used on estimated costs of activities to be implemented in the coming year. Examples of HCP compliance costs include fencing, trespass control, education, trail design, erosion control, fire management, and wildlife management. In addition to the costs included in the annual management budget that will fund most of the required activities, Exeter will pay the costs associated with the recurring elements such as monitoring (including the costs of telemetry and more intensive monitoring upon detection of a pygmy-owl, or determination that a pygmy-owl has established an active breeding territory, on the Property as set forth in section 7.3 of the EA/HCP), reporting, and consultation with the FWS, and with non-recurring elements such as pygmy-owl adaptive management and changed circumstances (EA/HCP 7.5).

- Promptly, upon issuance of the ITP, Exeter will erect a fence around the Reserve and provide for construction of safeguards (silt fence) around those portions of the Reserve adjacent to the Sky ranch Project area where development will occur. The estimated cost of the fencing and safeguards is approximately \$40,000. The remaining costs to be paid directly by Exeter on an annual basis will depend on the length of time required to select the Reserve management entity and adopt the RMP (EA/HCP 7.5).
- Exeter will submit a report of the amounts of annual funding and the endowment for FWS review (EA/HCP 7.5).
- Exeter will ensure that adequate funding for the HCP and any Changed Circumstances will be provided. A PAR analysis will be completed by Exeter to estimate the needed funding to implement the HCP until an RMP is complete and budgeted to the satisfaction of Exeter and the FWS (EA/HCP 8.0).
- Exeter will provide such funds as may be necessary to carry out its obligations under the HCP during the term of the ITP and in perpetuity, as described in the IA and ITP. Exeter will provide notice of any material change in Exeter's funding resources to the FWS, including a discussion of the nature of the change. If Exeter knows the prospective change more than 60 days before it occurs, Exeter shall give the FWS 60-days notice thereof (IA 9.5).
- Exeter shall establish an escrow fund to be available solely to the Manager to support the activities of the Manager on the Reserve. Until Exeter and the FWS agree on the amount to be deposited in the fund and the fund is established, Exeter shall be responsible for providing funding directly to the Manager to support the Manager's activities on the Reserve or for expending funds itself on any activity required by the HCP or the IA on the Reserve to be undertaken prior to the selection of the Manager pursuant to paragraph 10.1.b. of the IA (IA 9.6).
- If Exeter and/or the Manager propose that another entity assume its or their funding

and/or management obligations under the IA, Exeter and/or the Manager shall ensure that the assuming entity has sufficient funds to perform such obligations (IA 9.7).

Proposed Reporting

- By January 1 of each year for the life of the ITP, Exeter or the Reserve management entity will submit an annual written report describing the activities of Exeter and the Reserve Management entity (or other pertinent parties) required by the HCP, IA, and the ITP, and an analysis of whether the terms of the HCP, IA, and ITP were met for the reporting period. The report shall provide all reasonably available data regarding the status of activities (e.g., pygmy-owl surveys, ongoing and completed construction phases), any incidental take of pygmy-owls, and where required by the FWS, any known changes to the overall population of pygmy-owl that occurred in or immediately adjacent to the Property during the reporting period.
 - Cavity inspection Reports. Exeter will be required to submit any necessary nest-cavity inspection reports within 10 days of completion of fieldwork to the FWS Arizona Ecological Services Field Office.
 - Mortality Reports. Upon locating a dead, injured, or sick pygmy-owl, or any other endangered or threatened species, Exeter is required to contact the FWS Law Enforcement Office in Mesa, Arizona (480) 835-8289, for care and disposition instructions. Extreme care should be taken in handling sick or injured individuals to ensure effective and proper treatment. Care should also be taken in handling dead specimens to preserve biological materials in the best possible state for analysis of cause of death. In conjunction with the care of sick or injured endangered/threatened species, or preservation of biological materials from a dead specimen, Exeter and its contractor/subcontractor have the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.
- In addition, Exeter will seek technical assistance from the FWS in implementing these terms and conditions in a manner most effective for minimizing impacts to the pygmy-owl. The report shall also include the following certification from a responsible company official who supervised or directed the preparation of the report:
 - Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete.

All reports will be sent annually by January 1 to the Field Supervisor of the FWS Ecological Services Field Office, Phoenix, Arizona. Failure by Exeter to file a report is not a breach of this HCP unless and until either: 1) it is an intentional omission or 2) after notification by the FWS of the failure, Exeter does not respond within 30 days.

II. STATUS OF THE SPECIES/CRITICAL HABITAT

A detailed description of the life history and ecology of the pygmy-owl can be found in the *Birds of North America* (Proudfoot and Johnson 2000), *Ecology and Conservation of the Cactus Ferruginous Pygmy-owl in Arizona* (Cartron and Finch 2000), and in other information available from the Arizona Ecological Services Field Office website (arizonaes.fws.gov). Information specific to the pygmy-owl in Arizona is preliminary. Research completed in Texas has provided useful insights into the ecology of this subspecies and, in some instances, represents the best available scientific information. However, habitat and environmental conditions are somewhat different than in Arizona, and conclusions based on information developed in Texas and elsewhere may require qualification.

Species Description

The pygmy-owl is in the order Strigiformes and the family Strigidae. They are small birds of prey, averaging 6.75 inches in length. Males average 2.2 ounces with females slightly larger, averaging 2.6 ounces. The pygmy-owl is reddish brown overall, with a cream-colored belly streaked with reddish brown. The crown is lightly streaked, and a pair of dark brown/black spots outlined in white on the nape suggest eyes. The species lacks ear tufts and the eyes are yellow. The tail is relatively long for an owl and is reddish brown in color with darker brown bars. Pygmy-owls have large feet and talons relative to their size.

Listing and Critical Habitat

The Arizona population of the pygmy-owl was listed as an endangered distinct population segment on March 10, 1997 (62 FR 10730) without critical habitat. In response to a court order, approximately 731,712 acres of critical habitat were designated on July 12, 1999 (64 FR 37419) in areas within Pima, Cochise, Pinal, and Maricopa counties in Arizona. On January 9, 2001, a coalition of plaintiffs filed a lawsuit with the District Court of Arizona challenging the validity of the listing of the Arizona population of the pygmy-owl as an endangered species and the designation of its critical habitat. On September 21, 2001, the Court upheld the listing of the pygmy-owl in Arizona, but at our request and without otherwise ruling on the critical habitat issues, remanded the designation of critical habitat for preparation of a new analysis of the economic and other effects of the designation (National Association of Home Builders *et al.* v. Norton, Civ.-00-0903-PHX-SRB). The Court also vacated the critical habitat designation during the remand. We published a proposed rule to redesignate critical habitat in the Federal Register on November 27, 2002 (67 FR 71032). The proposal includes approximately 1,208,000 acres in portions of Pima and Pinal counties, Arizona.

The plaintiffs appealed the District Court's ruling on the listing of the pygmy-owl as a distinct population segment. On August 19, 2003, the 9th Circuit Court of Appeals rendered an opinion regarding this appeal, which held that, although the FWS did not arbitrarily find the Arizona pygmy-owl population to be discrete, the FWS arbitrarily found the discrete population to be significant. The judgment of the District Court was reversed and the case was remanded to the district court for further proceedings consistent with the 9th Circuit's opinion. Prior to being remanded to the district court, Defenders of Wildlife, intervenors on the original 2001 lawsuit, filed a petition with the 9th Circuit for rehearing, or, in the alternative, rehearing *en banc*. This petition was denied and the matter returned to the District Court, but no ruling has been issued,

nor has the right to appeal been forfeited. At this writing, therefore, the pygmy-owl remains listed as endangered, and proposed critical habitat exists.

Because conservation and recovery of the pygmy-owl may rely upon a landscape mosaic of appropriate habitat, we have proposed critical habitat areas that will link a network of State, private, and Federal lands. The proposed system of critical habitat is designed to provide an interconnected system of suitable habitat essential to Arizona pygmy-owl survival and maintain the viability of groups of pygmy-owls that are dependant upon continued genetic interchange and population immigration. Two premises were considered in establishing this system: 1) protecting verified pygmy-owl sites and areas with the presence of one or more of the constituent elements within the mean straight-line dispersal distance (8 km (5 mi)) from nest sites and three of the four recovery team-recommended Special Management Areas (SMAs); and 2) providing for the linkage of these verified sites with areas of suitable habitat for which we have adequate scientific information indicating that they are essential to the conservation of the listed population and in need of special management. A complete description of the primary constituent elements of proposed critical habitat and the proposed critical habitat units can be found in the Federal Register announcement of the proposed rule to designate critical habitat for the pygmy-owl (67 FR 71032). When consulting with Federal agencies on projects that may destroy or adversely modify critical habitat, we will evaluate the effects of their project on both the Unit and the whole of critical habitat. In that way, we can best evaluate the scope of effects and recommend project modifications that conserve or augment the values that would otherwise potentially be lost to that particular unit.

In September 1998, we appointed the Cactus Ferruginous Pygmy-Owl Recovery Team. The Team is comprised of a Technical Group of biologists (pygmy-owl experts and raptor ecologists) and an Implementation Group which includes representatives from affected and interested parties (i.e., Federal and State agencies, local governments, the Tohono O'odham Nation, and private groups). A draft recovery plan was released for public comment in January 2003. Following consideration of the public comments and depending on the resolution of listing litigation, we will work to finalize the recovery plan.

Life History

Pygmy-owls are considered non-migratory throughout their range. There are winter (November through January) pygmy-owl location records from throughout Arizona (University of Arizona 1995, Tibbitts 1996, Abbate *et al.* 1999, 2000). These winter records suggest that pygmy-owls are found within Arizona throughout the year and do not appear to migrate southward to warmer climates during the winter months.

The pygmy-owl is primarily diurnal (active during daylight) with crepuscular (active at dawn and dusk) tendencies. They can be heard making a long, monotonous series of short, repetitive notes.

Pygmy-owls are most vocal and responsive during the courtship and nesting period (February through June). Male pygmy-owls establish territories using territorial-advertisement calls to repel neighboring males and attract females. Calling and defensive behavior is also manifest in nesting territories from fledging to dispersal (June through August).

Usually, pygmy-owls nest as yearlings (Abbate *et al.* 1999, Gryimek 1972), and both sexes breed annually thereafter. Territories normally contain several potential nest-roost cavities from which responding females select a nest. Hence, cavities/acre may be a fundamental criterion for habitat selection. Historically, pygmy-owls in Arizona used cavities in cottonwood, mesquite, and ash trees, and saguaro cacti for nest sites (Millsap and Johnson 1988). Recent information from Arizona indicates nests were located in cavities in saguaro cacti for all but two of the known nests documented from 1996 to 2002 (Abbate *et al.* 1996, 1999, 2000, AGFD 2003). One nest in an ash tree and one in a eucalyptus tree were the only non-saguaro nest sites (Abbate *et al.* 2000).

Pygmy-owls exhibit a high degree of site fidelity once territories (the area defended) and home ranges (the area used throughout the year) have been established (AGFD 2003). Therefore, it is important that habitat characteristics within territories and home ranges be maintained over time in order for them to remain suitable. This is important for established pygmy-owl sites, as well as new sites established by dispersing pygmy-owls.

Pygmy-owls are more likely to be affected by projects within their home range because of the species' strong site fidelity. Behaviorally, the option to seek alternative areas outside of the home range appears limited, particularly for males.

Data on the size of areas used by pygmy-owls on an annual basis in Arizona are limited. Most of the telemetry data has been gathered during the breeding season due to the opportunity to capture the pygmy-owls and the limited battery life of transmitters. Until more complete information is available from Arizona, the home range size estimate we are using is based on telemetry work completed in Texas. In Texas, Proudfoot (1996) noted that, while pygmy-owls used between 3 and 57 acres during the incubation period, they used areas up to 279 acres in the winter. Proudfoot and Johnson (2000) indicate males defend areas with radii from 1,100 to 2,000 feet. Initial results from ongoing studies in Texas indicate that the home range of pygmy-owls may also expand substantially during dry years (G. Proudfoot, pers. comm.). Therefore, a 280-acre home range is considered necessary for pygmy-owls to meet their life history requirements on an annual basis.

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. Documented and suspected pygmy-owl predators include great horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), screech-owls (*Otus kennicottii*), and domestic cats (*Felis domesticus*) (Abbate *et al.* 2000, AGFD 2003). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999).

AGFD telemetry monitoring in 2002 indicated at least three of the nine young produced that year were killed by predators prior to dispersal during a year when tree species failed to leaf out due to drought conditions (AGFD 2003). Therefore, cover near nest sites may be important for young to fledge successfully (Wilcox *et al.* 1999, Wilcox *et al.* 2000). A number of fledgling pygmy-owls have perished after being impaled on cholla cactus, probably due to undeveloped flight skills (Abbate *et al.* 1999). In order to support successful reproduction and rearing of young,

home ranges should provide trees and cacti that are of adequate size to provide cavities in proximity to foraging, roosting, sheltering, and dispersal habitats, in addition to adequate cover for protection from climatic elements and predators, and occur in an appropriate configuration in relation to the nest site.

Vegetation communities, which provide a diversity of structural layers and plant species likely contribute to the availability of prey for pygmy-owls (Wilcox *et al.* 2000). Pygmy-owls also utilize different groups of prey species on a seasonal basis. For example, lizards, small mammals, and insects are utilized as available during the spring and summer during periods of warm temperatures (Abbate *et al.* 1999). However, during winter months, when low temperatures reduce the activity by these prey groups, pygmy-owls likely turn to birds as their primary source of food and appear to expand their use area in response to reduced prey availability (Proudfoot 1996). Therefore, conservation of the pygmy-owl should include consideration of the habitat needs of prey species, including structural and species diversity and seasonal availability. Pygmy-owl habitat must provide sufficient prey base and cover from which to hunt in an appropriate configuration and proximity to nest and roost sites.

Freestanding water does not appear to be necessary for the survival of pygmy-owls. During many hours of research monitoring, pygmy-owls have never been observed directly drinking water (Abbate *et al.* 1999, AGFD 2003). It is likely that pygmy-owls meet much of their biological water requirements through the prey they consume. However, the presence of water may provide related benefits to pygmy-owls. The availability of water may contribute to improved vegetation structure and diversity, which improves cover availability. The presence of water also likely attracts potential prey species improving prey availability.

Habitat

Pygmy-owls were historically recorded in association with riparian woodlands in central and southern Arizona (Bendire 1892, Gilman 1909, Johnson *et al.* 1987, Johnson *et al.* 2003). Plants present in these riparian communities included cottonwood (*Populus fremontii*), willow (*Salix* spp.), ash (*Fraxinus velutina*), and hackberry (*Celtis* spp.). However, recent records have documented pygmy-owls in a variety of vegetation communities such as riparian woodlands, mesquite (*Prosopis velutina*, and *P. glandulosa*) bosques (Spanish for woodlands), Sonoran desertscrub, semidesert grassland, and Sonoran savanna grassland communities (see Brown 1994 for a description of these vegetation communities).

In recent years, pygmy-owls have been primarily found in the Arizona Upland Subdivision of the Sonoran desert, particularly Sonoran desertscrub (Phillips *et al.* 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985, Johnsgard 1988). This subdivision is limited in its distribution, forming a narrow, curved band along the northeast edge of the Sonoran Desert from the Buckskin Mountains, southeast to Phoenix, Arizona, and south into Sonora, Mexico. It is described as a low woodland of leguminous trees with an overstory of columnar cacti and with one or more layers of shrubs and perennial succulents. Within the United States, columnar cacti include either saguaros (*Carnegiea gigantea*), or organ pipe cactus (*Stenocereus thurberi*). Trees within this subdivision include blue paloverde (*Cercidium floridum*), foothills paloverde (*C. microphyllum*), ironwood (*Olneya tesota*), mesquites (*Prosopis* spp.), and cat-claw acacia

(*Acacia* spp.). Cacti of many species are found within this subdivision, and include many varieties of cholla and prickly pear (*Opuntia* spp.), fishhook barrel cactus (*Ferocactus wislizenii*), and compass barrel cactus (*F. acanthodes*) (Brown 1994). The paloverde-cacti mixed scrub series is described as developed on the bajadas and mountainsides away from valley floors. A bajada is the area between level plains and the foot of a mountain and is dissected by arroyos, exhibiting numerous variations in slope and pattern. While there is great variation between bajadas, they are generally characterized by good drainage and slowed evaporation, resulting in enhanced growing conditions for xerophytic plants. Cacti are particularly prevalent on bajadas, and woody, spiny shrubs, small trees, and annuals are abundant. The increased diversity of plants in turn supports a diversity of wildlife species (Benson and Darrow 1981, Olin 1994). A list of plant and wildlife species associated within this subdivision can be found in Appendix II of Brown (1994), and is incorporated herein by reference.

While there are hundreds of thousands of acres of Sonoran Desertscrub, not all of this vegetation community is vegetatively suitable for pygmy-owls. Preliminary habitat assessment data appears to indicate that those areas of Sonoran Desertscrub characterized by high plant species diversity, high structural diversity, and the presence of tall canopy are the areas being used by pygmy-owls (Wilcox *et al.* 2000, Flesch 2003a). These types of areas are typically located along drainages and wash systems, or in areas with better soil and moisture conditions such as bajadas.

However, over the past several years, pygmy-owls have also been found in riparian and xeroriparian communities and semidesert grasslands as classified by Brown (1994). Desertscrub communities are characterized by an abundance of saguaros or large trees, and a diversity of plant species and vegetation strata. Xeroriparian habitats contain a rich diversity of plants that support a wide array of prey species and provide cover. Semidesert grasslands have undergone the invasion of velvet mesquites in uplands and linear woodlands of various tree species along bottoms and washes.

While plant-species composition differs among these communities, there are certain unifying characteristics such as the presence of vegetation in fairly dense thickets or woodlands, the presence of trees, saguaros, or organ pipe cactus large enough to support cavities for nesting, and elevations below 1,200 meters (m) (4,000 feet (ft)) (Swarth 1914, Karalus and Eckert 1974, Monson and Phillips 1981, Johnsgard 1988, Enriquez-Rocha *et al.* 1993, Proudfoot and Johnson 2000). Large trees provide canopy cover and cavities used for nesting, while the density of mid- and lower-story vegetation provides foraging habitat and protection from predators, and it contributes to the occurrence of prey items (Wilcox *et al.* 2000). Perch substrates used by pygmy-owls for calling are typically the tallest trees available within a home range, though pygmy-owls have also been noted calling from within saguaro cavities (Flesch 2003a).

The density of trees and the amount of canopy cover preferred by pygmy-owls in Arizona has not been fully defined. However, preliminary results from a habitat selection study indicate that nest sites tend to have a higher degree of canopy cover and higher vegetation diversity than random sites (Wilcox *et al.* 2000). Overall vegetation density may not be as important as patches of dense vegetation with a developed canopy layer interspersed with open areas. Vegetation structure may be more important than species composition (Wilcox *et al.* 1999, Cartron *et al.* 2000a). This is related to the fact that canopy cover and layers of vegetation provide hunting

perches, thermal cover, and promote predator avoidance regardless of species. Larger trees with greater canopy also have a greater potential to support cavities needed for nesting. Flesch (1999) indicated that areas with large trees and canopy coverage are likely important areas for pygmy-owls in the Altar Valley, though the author also noted (Flesch 2003a) that the presence of large, columnar cacti was also a potentially critical factor due to a greater availability of cavities relative to broadleaf trees. Riparian and xeroriparian (dry washes) areas, which are often used by pygmy-owls, are generally characterized by increased vegetation layers, higher plant diversity, and larger tree sizes because of increased moisture availability.

Species Status and Distribution

The pygmy-owl is one of four subspecies of the ferruginous pygmy-owl. It occurs from lowland central Arizona south through western Mexico to the States of Colima and Michoacan, and from southern Texas south through the Mexican States of Tamaulipas and Nuevo Leon. Only the Arizona population of the pygmy-owl is listed as an endangered species (U.S. Fish and Wildlife Service 1997).

The northernmost historical record for the pygmy-owl is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the pygmy-owl to be "quite common" in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, the pygmy-owl, prior to the mid-1900s, was "not uncommon," "of common occurrence," and a "fairly numerous" resident of lowland central and southern Arizona in cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). Additionally, pygmy-owls were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (Hunter 1988, AGFD 1999).

Table 2. Numbers and distribution of documented pygmy-owl locations 1993 - 2003 (Abbate *et al.* 1996, 1999, 2000, AGFD 2002a)

Area	Year	Sites	Adults	Young
Northwest Tucson	1993-1997	9	19	6
	1998	4	7	11
	1999	6	10	16
	2000	8	11	11
	2001	5	8	10
	2002	9	9	2
	2003	4	4	0

Pinal County	1993-1997	2	6	1
	1998	2	2	0
	1999	3	5	5
	2000	2	3	5
	2001	0	0	0
	2002	1	1	0
	2003	0	0	0
Altar Valley	1998	2	4	unknown
	1999	14	18	11
	2000	6	8	4
	2001	11	18	12
	2002	8	10	7
	2003	5	9	16
Organ Pipe Cactus National Monument and Cabeza Prieta National Wildlife Refuge	1993-1997	2	2	0
	1998	1	2	4
	1999	3	4	unknown
	2000	6	8	0
	2001	7	10	5
	2002	3	4	0
	2003	5	6?	0

Records from the eastern portion of the pygmy-owl's range include an 1876 record from Camp Goodwin (nearby current day Geronimo) on the Gila River, and a 1978 record from Gillard Hot Springs, also on the Gila River. Pygmy-owls have been found as far west as the Cabeza Prieta Tanks, Yuma County in 1955 (Monson 1998). Hunter (1988) found fewer than 20 verified records of pygmy-owls in Arizona for the period of 1971 to 1988.

Documentation of the total number of pygmy-owls and their current distribution in Arizona is incomplete. Survey and monitoring work in Arizona resulted in documenting 41 adult pygmy-owls in 1999, 34 in 2000, 36 in 2001, 24 in 2002, and, most recently, 21 in 2003 (AGFD 2002a). Most of these pygmy-owls were distributed in four general areas: northwest Tucson, southern Pinal County, Organ Pipe Cactus National Monument, and the Altar Valley. We believe that more pygmy-owls exist in Arizona, but systematic surveys have not been conducted in all areas of potential habitat. Table 2 summarizes the numbers of pygmy-owls documented since 1993.

In addition, recent survey information has shown pygmy-owls to be more numerous adjacent to and near the Arizona border in Mexico (Flesch and Steidl 2000). There also exists considerable unsurveyed habitat on the Tohono O'odham Nation and, although we have no means of quantifying this habitat, the distribution of recent sightings on non-Tribal areas east, west, and south of the U.S. portion of the Tohono O'odham Nation lead us to reasonably conclude that these Tribal lands may support meaningful numbers of pygmy-owls. Consequently, we believe that it is highly likely that the overall pygmy-owl population in Arizona is maintained by the movement and dispersal of pygmy-owls among groups of pygmy-owls in southern Arizona and northern Mexico resulting from the connectivity of suitable habitat. The extent to which pygmy-owls disperse across the U.S./Mexico border is unknown, but recent survey work indicates that pygmy-owls regularly occur along the border (Flesch and Steidl 2000, Flesch 2003b). However, addressing habitat connectivity and the movements of pygmy-owls within Arizona is a primary consideration in the analysis of this project due to the importance of maintaining dispersal and movement among pygmy-owl groups within the U.S.

The patchy, dispersed nature of the pygmy-owl populations in Arizona and Mexico (Flesch 2003b) suggests that the overall population may function as a metapopulation. A metapopulation is a set of subpopulations within an area, where movement and exchange of individuals among population segments is possible, but not routine. A metapopulation's persistence depends on the combined dynamics of the productivity of subpopulations, the maintenance of genetic diversity, the availability of suitable habitat for maintenance and expansion of subpopulations, and the rescue of subpopulations that have experienced local extinctions by the subsequent recolonization of these areas by dispersal from adjacent population segments (Hanski and Gilpin 1991, 1997). The local groups of pygmy-owls within Arizona may function as subpopulations within the context of metapopulation theory. However, more information is needed regarding the population dynamics of pygmy-owls in Arizona.

The ability and opportunity for pygmy-owls to disperse within population segments, as well as emigrate to adjacent population segments is likely important for the long-term persistence of pygmy-owls in Arizona. Pygmy-owl dispersal patterns are just beginning to be documented. One banded juvenile in Arizona was observed in 1998 approximately 3.9 km (2.4 mi) from its nest site following dispersal. Five young monitored with radio telemetry during 1998 were recorded dispersing from 3.5 km (2.17 mi) to 10.4 km (6.5 mi) for an average of 5.9 km (3.6 mi) (Abbate *et al.* 1999). In 1999, 6 juveniles in Arizona dispersed from 2.3 km (1.4 mi) to 20.7 km (12.9 mi) for an average of 10 km (6.2 mi) (Abbate *et al.* 2000). In Arizona, the maximum documented dispersal distance is 34.8 km (21.8 mi) (AGFD 2002b). Juveniles typically disperse from natal areas in July and August and do not appear to defend a territory until September.

They typically fly from tree to tree instead of long flights and may move up to 1.6 km (1 mi) or more in a night (Abbate *et al.* 1999). Trees of appropriate size and spacing appear to be necessary for successful dispersal, but specific data describing this pattern are currently unavailable. Once dispersing male pygmy-owls settle in a territory (the area defended by a pygmy-owl), they rarely make additional movements outside of their home range. For example, spring surveys have found male juveniles in the same general location as observed the preceding autumn (Abbate *et al.* 2000). However, unpaired female dispersers may make additional movements, which sometimes continue into the subsequent breeding season (AGFD 2003).

Reasons For Listing

In determining whether listing of the Pygmy-owl was warranted, we were required under section 4(a)(1) of the ESA to consider five listing factors: a) the present or threatened destruction, modification, or curtailment of its habitat or range; b) overutilization for commercial, recreational, scientific, or educational purposes; c) disease or predation; d) the inadequacy of existing regulatory mechanisms; or e) other natural or manmade factors affecting its continued existence. We determined that the following three factors applied to the pygmy-owl - Arizona DPS to the extent that endangered status is appropriate (USFWS 1997).

Factor 1 - The present or threatened destruction, modification, or curtailment of the species' habitat or range.

The pygmy-owl is threatened by present and potential future destruction and modification of its habitat throughout a significant portion of its range in Arizona (Phillips *et al.* 1964, Johnson *et al.* 1979, Monson and Phillips 1981, Johnson and Haight 1985, Hunter 1988, Millsap and Johnson 1988). One of the most urgent threats to pygmy-owls in Arizona continues to be the loss and fragmentation of habitat (U.S. Fish and Wildlife Service 1997, Abbate *et al.* 1999). The complete removal of vegetation and natural features required for many large-scale and high-density developments directly and indirectly affects the pygmy-owl (Abbate *et al.* 1999).

Factor 4 - Inadequacy of existing regulatory mechanisms.

Although the pygmy-owl in Arizona is considered non-migratory, it is protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712). The MBTA prohibits "take" of any migratory bird; however, unlike the ESA, there are no provisions in the MBTA preventing habitat destruction unless direct mortality or destruction of an active nest occurs. Other Federal and State regulations and policies such as the Clean Water Act (CWA), military policies (Barry M. Goldwater Range), National Park Service policy, and including the pygmy-owl on the State of

Arizona's list of Species of Special Concern will not adequately protect the pygmy-owl in Arizona from further decline. There are currently no provisions under Arizona statute addressing the destruction or alteration of pygmy-owl habitat.

Factor 5 - Other natural or manmade factors affecting its continued existence.

Recent genetic research suggests that pygmy-owls in the action area show evidence of genetic separation from other populations in Arizona and Mexico (Proudfoot and Slack 2001). They have found that the low level of genetic variation and the absence of shared haplotypes between pygmy-owls in northwestern Tucson and the remainder of the State and Mexico increases the potential for the natural divergence of this population from the rest of the pygmy-owl population in Arizona. In addition, these owls have extremely low levels of average haplotype diversity. Researchers acknowledge this may also be a product of sampling (i.e., sampling from one maternal lineage) and/or an extremely high level of inbreeding as a result of low population numbers and geographic isolation.

Application of pesticides and herbicides in Arizona occurs year-round, and these chemicals may pose a threat to the pygmy-owl. The presence of pygmy-owls in proximity to residences, golf courses, agricultural fields, and nurseries may cause direct and indirect exposure to pesticides and herbicides.

Additional Threats

Although not used as the basis of listing, we identified several other potential threats to the pygmy-owl in the final listing rule (USFWS 1997).

Recreational Birding. The pygmy-owl is rare and highly sought by birders who concentrate at several of the remaining known locations of pygmy-owls in the United States. Oberholser (1974) and Hunter (1988) suggest that recreational birding may disturb pygmy-owls in highly visited areas, affecting their occurrence, behavior, and reproductive success. Limited, conservative bird watching is probably not harmful; however, excessive attention and playing of tape-recorded calls may at times constitute harassment and affect the occurrence and behavior of the pygmy-owl (Oberholser 1974, Tewes 1995). For example, in 1996, a resident in Tucson reported a pygmy-owl sighting which subsequently was added to a local birding hotline, and the location was added to their website on the internet. Several carloads of birders were later observed in the area of the reported location (AGFD pers. comm. 1999). As recently as 2003, concerns have been expressed by property owners that birders and others have been documented trying to get photos or see pygmy-owls at occupied sites (AGFD pers. comm.).

Predation and Disease. Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. In Texas, eggs and nestlings were depredated by raccoons (*Procyon lotor*) and bullsnakes (*Pituophis catenifer*). Both adult and juvenile pygmy-owls are likely killed by great horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), and eastern screech-owls (*Otus asio*) (Proudfoot and Johnson 2000). Similar predators are suspected in Arizona. Pygmy-owls are particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999).

Hematozoa (blood parasites) may cause neonatal bacterial diarrhea, marginal anemia, and septicemia (Hunter *et al.* 1987), reducing survival and recruitment of birds. However, no evidence of hematozoa in pygmy-owls in Texas (Proudfoot and Radomski 1997) or Arizona (Proudfoot *et al.* unpubl. data) has been recorded. Trichomoniasis also can cause mortality of

raptors (e.g., Cooper's hawks in Tucson) (Boal *et al.* 1998) that ingest doves and pigeons, but the effects of this disease on pygmy-owls in Arizona is unknown. Most species of raptors in the Tucson area, including small owls such as screech-owls and elf owls, have had documented cases of trichomoniasis (AGFD pers. comm.). House finches and doves are prey items for pygmy-owls in Arizona and are carriers of trichomoniasis (Abbate *et al.* 1999). Recent investigations in Texas and Arizona have indicated the regular occurrence of avian parasites in the materials inside of pygmy-owl nest cavities. The numbers of parasites may be high enough to affect nestling pygmy-owls. Hence, further study is needed in Arizona and Texas to assess the potential for diseases and parasites to affect pygmy-owl populations. The West Nile Virus has been identified as the cause of a number of unusual raptor mortalities in some areas of the eastern United States. This virus is expanding to the west and the potential for infecting pygmy-owl warrants investigation and development of monitoring strategies.

Human-related Mortality. Direct and indirect human-caused mortalities (e.g., collisions with cars, glass windows, fences, power lines, domestic cats), while likely uncommon, are often underestimated, and probably increase as human interactions with pygmy-owls increase (Banks 1979, Klem 1979, Churcher and Lawton 1987). This may be particularly important in the Tucson area where pygmy-owls are located in proximity to urban development. Pygmy-owls flying into windows and fences, resulting in serious injuries or death to the birds, has been documented twice. A pygmy-owl collided into a closed window of a parked vehicle; it eventually flew off, but had a dilated pupil in one eye indicating neurological injury as the result of this encounter (Abbate *et al.* 1999). In another incident, an adult pygmy-owl was found dead at a wire fence; apparently it flew into the fence and died (Abbate *et al.* 1999). AGFD also has documented an incident of individuals shooting BB guns at birds perched on a saguaro, which contained an active pygmy-owl nest. In Texas, two adult pygmy-owls and one fledgling were killed by a domestic cat. These pygmy-owls used a nest box about 75 meters from a human residence. In 2001, predation by domestic cats is also suspected by researchers in two instances in northwestern Tucson (AGFD 2003). Free-roaming cats can also affect the number of lizards, birds, and other prey species available to pygmy-owls; however, very little research has been done in the southwest on this potential problem.

Rangewide Trend

Data collection related to the pygmy-owl has only been consistent throughout the state for the past few years (see Table 2). Even with expanded survey efforts since the pygmy-owl was listed as endangered in 1997, there are still many areas within Arizona that have not been surveyed or for which survey efforts are inadequate. Because research has been conducted for only a few years and because research and survey efforts have not been comprehensive or random in nature, it is not possible to determine population size or trend within Arizona. Additionally, the Tohono O'odham Nation supports pygmy-owls, but due to cultural and political constraints, complete information on the numbers or distribution on the Nation are not available. Given the historical distribution of pygmy-owls in Arizona, it is clear that they have declined throughout the state to the degree that they are now extremely limited in distribution (Monson and Phillips 1981, Davis and Russell 1984, Millsap and Johnson 1988, Proudfoot and Johnson 2000, Johnson *et al.* 2003). Johnson *et al.* (2003) hypothesized that large-scale water development (damming and diversion of the Salt and Verde rivers) led to initial declines in species abundance and distribution.

Information gathered over the past few years indicates that pygmy-owls occur in Arizona in low numbers and are patchily distributed across southern Arizona. They occur in four main areas of the state, and numbers found within each area tend to vary on an annual basis (Table 2). Data are insufficient to determine meaningful trends, but it is likely that for the pygmy-owl to persist in Arizona, additional pygmy-owls need to be located, productivity needs to be expanded, and population support from Mexico or artificial augmentation is probably required. Currently, within the action area for this project, there are only three pygmy-owl sites that are known to be active, and all three are unpaired males. The immigration of one or more female pygmy-owls into this area is essential to maintaining this group of pygmy-owls and their contribution to the overall survival and recovery of the pygmy-owl in Arizona.

Information about populations of pygmy-owls in Mexico is limited. Based on personal observations and anecdotal information, Russell and Monson (1998) recorded no decline in numbers from Sonora, Mexico. However, the first systematic surveys for pygmy-owls in Sonora were conducted in 2000 and 2001. These surveys resulted in the detection of 524 pygmy-owls along 329 transects, covering 1,113 km (Flesch and Steidl 2000, Flesch 2003b). Pygmy-owls were detected throughout the state of Sonora, from the international border south to the Sonora/Sinaloa border, with the exception of the area around Hemosillo where agricultural and buffelgrass conversion has impacted available habitat (Flesch 2003b). In 2000 and 2003, AGFD personnel documented, through the use of radio telemetry, the movement of two dispersing juvenile pygmy-owls into Mexico from nests just north of the international border (AGFD pers. comm.). However, while movement of pygmy-owls across the border likely occurs, we have no information regarding the extent to which this happens.

In addition, we are not aware of any management or conservation practices in Mexico that are directed towards pygmy-owls. The expansion of agricultural and urban land uses increases habitat loss and fragmentation in Mexico and the stability of pygmy-owl populations cannot be determined. In Mexico, millions of acres of Sonoran Desert and thornscrub are being converted to buffelgrass (*Pennisetum ciliaris*), which represents both a direct and an indirect loss of habitat because of invasion into adjacent areas and increased fire frequency and intensity (McLaughlin and Bowers 1982, Burquez-Montijo et al. 2002). Burquez and Yrizar (1997) state that given the government subsidies to establish exotic introduced grasslands to maintain large cattle herds and to support marginal cattle ranching, the desert and thornscrub in Sonora will probably be replaced in the near term by ecosystems with significantly lower species diversity and reduced structural complexity, unless control measures are implemented. Such replacement will continue to affect pygmy-owl prey base and habitat availability. The importance of pygmy-owls in Arizona to the portion of the population occupying Sonoran Desertscrub and Semi-desert Grasslands will increase as habitat is converted in Mexico.

Under the current taxonomic classification, cactus ferruginous pygmy-owls also occur in southern Texas. However, recent genetic work (Proudfoot and Slack 2001) may indicate that the pygmy-owls in Texas are genetically distinct from the pygmy-owls in Arizona, possibly to the subspecies level. Regardless of the genetic distinction, pygmy-owls in Texas are found primarily on large private ranches where the levels of threat to habitat are reduced from those found in Arizona. Additionally, population numbers are higher and appear to be stable. Pygmy-owl

populations in Texas are geographically separated from Arizona and currently provide no genetic or demographic support for Arizona populations.

Since listing in 1997, approximately 159 Federal agency actions have undergone informal consultation regarding the potential effects to pygmy-owls. These are actions that included sufficient measures to avoid or minimize impacts to the pygmy-owls so that the effects were insignificant or discountable. At least 46 Federal agency actions have undergone formal section 7 consultation throughout the pygmy-owl's range. Of these, only one resulted in a draft jeopardy opinion, and that was resolved as a non-jeopardy final opinion. Six formal consultations anticipated incidental take of one or more pygmy-owls. However, only take in the form of harassment was authorized. Given the extremely low number of known pygmy-owls in Arizona, lethal take of even a single owl would make it difficult to avoid jeopardizing the species. Many activities continue to adversely affect the distribution and extent of all types of pygmy-owl habitat throughout its range (e.g., development, urbanization, grazing, fire, recreation, native and non-native habitat removal, river crossings, ground and surface water extraction). Since 1997, we have provided technical assistance to hundreds of projects that do not have a Federal nexus, primarily single-family residences. These actions have no legal requirement to follow the recommendations we provide under technical assistance, and we have no way of monitoring if or to what extent the recommendations are incorporated. They may or may not contribute to the conservation of the pygmy-owl, but they certainly contribute to ongoing effects to pygmy-owl habitat. Stochastic events, such as drought, fire, and predator population status, also continue to adversely affect the distribution and extent of pygmy-owl habitat.

Anticipated or actual loss of occupied pygmy-owl habitat due to Federal or federally-permitted projects has resulted in biological opinions that have also led to acquisition of otherwise unprotected property specifically for conservation of the pygmy-owl.

III. ENVIRONMENTAL BASELINE

Environmental Baseline

The environmental baseline includes past and present impacts of all Federal, state, or private actions in the action area; the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation; and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR '402.02). In the past, we have defined the action area as the project site plus a 21-mile buffer area defined by the maximum documented dispersal distance for juvenile pygmy-owls. This was based on the maximum straight-line distance traveled from natal areas for juvenile pygmy-owls in Arizona (AGFD 2002b). With so few individual pygmy-owls in Arizona, the maximum travel distance may be periodically needed to maintain genetic interchange between groups of pygmy-owls. Results of preliminary genetic analysis (Proudfoot and Slack 2001) and observations of incestuous breeding

provide evidence that genetic variability may be low within the action area. On two separate occasions in the action area, siblings of the same nest were documented breeding with each other the following year (Abbate *et al.* 1999). Instances of sibling breeding may be a reflection of small isolated populations of pygmy-owls, and maintaining genetic diversity within depressed populations is important to maintain genetic stochasticity and fitness. AGFD (Abbate *et al.* 1999) has documented movement between pygmy-owls in southern Pinal County and northwest Tucson, therefore, maintaining this genetic interchange is important. Under this scenario, action areas thus included all known pygmy-owls within northwest Tucson and southern Pinal County. Based on this information, we continue to believe that these are important considerations in analyzing the effects of an action on the status of the species, but do not believe these analyses are appropriately conducted on the action area-level.

More recently, we have made an effort to determine action area based on the extent of the indirect effects resulting from the proposed action. The revised action area determination thus includes: (1) the area affected by increased traffic and other urban effects; (2) increased predation from subsidized predators and household pets, domestic cats in particular; and (3) incremental, adverse changes to the geomorphology of the Tortolita Fan.

The presence of transportation infrastructure (i.e. roads) often degrades and fragments habitat, and given that such infrastructure is typically part of a network or system, the effects are often synergistic and widespread (Seiler 2001). Where such features are already present, the initial adverse effects of new residential development are the result of increased use of that infrastructure. Roads present a mortality hazard to pygmy-owls. While narrower roads or wider roads with medians that incorporate trees can minimize the risk of mortality, it cannot be eliminated. Further, the risk of vehicle-strike mortality is likely related to the number of vehicles using the road; a greater number of vehicles (or a greater frequency of use) can reasonably be expected to increase the probability that a pygmy-owl will be struck. Given the pygmy-owl's rarity and patchy distribution, any vehicle strike mortality could have serious adverse consequences to the regional subpopulation. As the population and number of vehicles increases in an area, existing roads are often widened to accommodate the increase. Wider roads result in an increased distance of open area without vegetation or cover across which pygmy-owls must fly. Behaviorally, pygmy-owls are reluctant to cross wide, open areas, and wide roadways may represent an impediment to pygmy-owl movements.

The action area can be partially defined by the portion of the existing transportation network likely to be affected by the construction of the Sky Ranch Project. The project area is largely rural, with a patchy distribution of residential and commercial developments of varying densities. The Sky Ranch Project will include no commercial or retail development, so it is likely that an appreciable portion, if not all, of the residents will travel by car to work, to regional shopping centers, schools, etc.

As discussed above, it is also reasonable to assume that incremental increases in traffic volume will eventually necessitate the improvement of existing arterial roads. Such improvements are likely to include widening to accommodate additional traffic, left-turn lanes, wider shoulders, etc. Local governing bodies, including Pima County and the towns of Marana and Oro Valley, assess Aimpact fees on new development; roads are included in these surcharges. Marana raises

a large proportion of its money for roads from a 2% tax on new-home construction (The Arizona Daily Star 2003), and Oro Valley recently increased its roadway development impact fee to increase the capacity of the town's roadways system (The Northwest Explorer 2003), thus indicating that road construction and/or improvements are indirect, interdependent effects of that construction. As such, the action area thus must include all pygmy-owl territories and dispersal corridors intersected by those roads that are likely to be affected by the incremental increases in vehicular traffic from the Skyranch Project. The extent of those effects may be defined by evaluating average trip distance. The Bureau of Transportation Statistics (2003) determined the average daily mileage of person-trips in personal vehicles to be approximately 10 miles. This average distance must necessarily be applied to the major arterial streets serving the proposed Skyranch Project, including Tangerine Road, El Camino de Mañana, Thornydale Road, and Cortaro Farms Road. Further, the reasonable certainty that an interchange will be constructed to connect the Linda Vista Boulevard/El Camino de Mañana junction to Interstate 10, as well as the contribution of impact fees from the proposed project to road projects in Marana renders that road reasonably certain to eventually be subjected to increased traffic volume from the Skyranch Project. Within 10 miles of the project, these arterial routes cross the 600-meter radii of three pygmy-owl home ranges. These routes also cross the potential 5-mile mean pygmy-owl dispersal distance from an additional 12 home ranges not directly intersected as described above. This necessitates that we consider the effects of the proposed action on pygmy-owls associated with 15 pygmy-owl home ranges and breeding and dispersal habitat adjacent to the affected roadways within 10 miles of the project site. While not all of these home ranges are currently occupied, research monitoring has shown that vacant pygmy-owl home ranges are sometimes re-occupied over time (AGFD 2003).

The action area may be further defined by the area that could be affected by subsidized predators, such as household cats. The scope of this effect is related primarily to the home-range size of the predator. While home range data exist for a variety of predators, the effects of potentially-increased prey bases near irrigated urban areas confounds the determination. House cats, however, have been studied in wildland/urban interfaces. Goltz *et al.* (2001) studied feral cat predation of passerine birds in dry, high altitude areas in Hawaii National Park and determined that home ranges of male cats ranged from 10 to 95 square kilometers (2,471 to 23,475 acres). The authors also noted that two of the male cats tracked roamed up to 25 kilometers (15.5 miles) between sites. Edwards *et al.* (2001) studied male feral cats in a semiarid woodland in central Australia and noted long-term mean home ranges as large as 2,210.5 hectares (5,462 acres), 24-hour mean home ranges of 249.7 hectares (617 acres), and movements of up to 34 kilometers (21.1 miles). While these numbers are compelling, they represent movement of feral cats in relatively wild lands; home ranges of house cats are more applicable to this analysis. Regardless, it should be noted that feral cats originate as escaped pet house cats or are their progeny.

Barratt (1995) conducted *house* cat home range and predation studies in Canberra, Australia in a system of suburbs interspersed within remnant grassland, woodland, and open-forest habitats and found that the largest day-time home range among the four cats who entered the woodlands was 17 hectares (42 acres), the largest night range was 28 ha (69 acres), and the furthest distance moved into adjoining habitat was 900 meters (0.6 mile). This sort of widely-ranging house cat must be considered a potential predator on the pygmy-owl. Moreover, the animals taken by the

cats (small mammals, birds, and reptiles) overlap with the prey base of the pygmy-owl, indicating that interspecific competition for prey could occur. We thus consider the action area defined by the effects of pets (house cats) to include the project site (less the area of the access road) and not less than a 900-meter (0.6 mile, or 2953 feet) buffer around it. This 900 meter buffer accounts for approximately 1,015 acres of indirect effects, and overlaps two pygmy-owl home ranges, one on the project site and one to the south, as well as known dispersal routes on and adjacent to the project.

A third category of indirect effects influences the action area for the Skyranch Project and is related to incremental changes in surface-water hydrology across the Tortolita Fan. Alluvial Fans are depositional landforms, developed over geologic time, at the base of mountain ranges where ephemeral streams emerge from the higher gradient channels of the highlands to a markedly lower gradient valley floor (Hydrologic Engineering Center 1992, Smith 2000). The fan terminology arises from the radial shape of the channels and depositional features on the plain. The lowlands surrounding the Tortolita Mountains also exhibit characteristics of alluvial slopes, which are differentiated from fans in that the channels are largely parallel, rather than radiating from the toe of the mountain front.

Changes in the flow and/or sediment supply to or within an alluvial fan can affect the fan's downstream surface. Of particular concern to us are the effects of sediment removal and/or altered timing and magnitude of peak flows. While changes at an alluvial fan's apex (or within the mountain/lowland transition of an alluvial slope) are expected to have the greatest effect, any retention of water and the subsequent settling and storage of sediment can affect the sediment transport capacity, or competence, of the flow (Hydrologic Engineering Center 1992). When competence of the flow exceeds the sediment load available, channel incision and/or widening are likely to occur. Such erosional processes may remove xeroriparian vegetation from within and adjacent to channels, reduce alluvial ground water availability, and if sufficiently advanced, necessitate the placement of structural flood control measures such as grade-control features and bank protection. The incremental development of the Tortolita Fan may thus precipitate landscape-scale vegetative changes to the fan that are adverse to pygmy-owls. These changes could manifest in the channels from the project area downstream to the Santa Cruz River, thus intersecting five pygmy-owl home ranges and the potential dispersal routes from the other 10 pygmy-owl home ranges within five miles. This is significant due to the fact that washes and drainages provide vegetation characteristics utilized by breeding and dispersing pygmy-owls. The extent and timing of hydrologic effects is somewhat speculative and difficult to quantify. However, impacts to hydrology are an effect of this project that extends beyond the project boundaries and is, therefore, considered in determining the action area.

The action area for the Skyranch Project is defined by the direct and indirect effects resulting from the effects of house cats (900 meter radius), increased traffic and road effects (10 mile mean trip distance), and fluvial effects (drainages and associated vegetation downstream to the Santa Cruz River). These effects influence the viability of proposed Critical Habitat Unit 3 (CHU 3). The effects to this critical habitat unit are key in our evaluation of whether this project will result in an appreciable reduction in the survival and recovery of the species or adversely modify proposed critical habitat. The action area contains portions of four pygmy-owl home ranges and intersects dispersal habitat and known dispersal pathways for an additional

11 pygmy-owl home ranges. Critical habitat was proposed based on pygmy-owl occupancy status and/or the area's contribution to habitat connectivity and habitat availability needed for population expansion. Effects on the past and current function of these areas have occurred as a result of capital improvement projects, residential and commercial development, and agricultural activities. In particular, these activities have affected the amount of available pygmy-owl breeding habitat and have resulted in loss of habitat connectivity and increased fragmentation. Remaining areas of pygmy-owl habitat within the action area are very important. The following discussion further elaborates on past and ongoing effects within the action area.

The action area is within the palo verde-cacti-mixed scrub series of the Arizona Upland Subdivision of the Sonoran Desert scrub community. The action area is also characterized by existing and ongoing urbanization, which has had the effect of removing and fragmenting suitable pygmy-owl habitat. During the past three years, the FWS completed 13 formal section 7 consultations and 69 informal section 7 consultations within the CHU 3 (e.g., planned residential, commercial, and other developments) and have provided technical assistance to hundreds of individuals seeking to develop single-family residences on individual lots and other non-Federal projects. There are also many projects, primarily single-family residences, where the FWS does not have the opportunity for input. At least two commercial projects where clearing of vegetation occurred proceeded without FWS input. All of these projects, combined with existing development, contribute to habitat fragmentation and reduce available habitat, particularly in the southern portion of the action area. Areas large enough to provide for successful breeding and dispersal are most limited in the areas to the south and east of the Sky Ranch Project.

Dove Mountain and Heritage Highlands, together covering close to 5,600 acres, are mixed-use developments located in close proximity to the north and west of the project parcel. Consultation was conducted for a portion of Dove Mountain and a portion of Heritage Highlands, and actions are being implemented to reduce effects on pygmy-owls. However, approximately 97 acres of the Heritage Highlands project has been or is being graded and developed without undergoing section 7 consultation. The Section 36 development is situated immediately adjacent to and northwest of the project site and construction will soon begin on up to 172 acres of the 598 acres of habitat in the project site. These residential, commercial, and golf developments have removed areas of habitat and contribute to habitat fragmentation, but have also set aside habitat areas that are suitable for dispersal and breeding.

In July 2000, we completed a consultation with the EPA for a 20-acre residential development (Countryside Vistas Blocks 5 and 6) approximately 4 miles to the south. In December 2000, we completed a consultation with the EPA for a 29-acre residential development (Tecolote de Oro) approximately 4.5 miles to the southeast. In July 2001, we completed a consultation on the 7-acre Crescent Ridge Apartments, approximately 4 miles to the southeast. In December 2001, we completed two consultations with the EPA: a 7.86-acre project for Mountain View High School approximately 4 miles to the southeast, and a 141-acre residential development (Hartman Vistas), approximately 4 miles to the south. In February 2002, we completed a consultation with the EPA on improvements to Thornydale Road, which removed nine acres of suitable habitat approximately 5 miles to the south. In April 2002, we completed consultation with the EPA on a 150-acre residential and commercial development (Chaparral Heights) approximately 4 miles to the southeast of the project site. In July 2003, we completed consultation on the development of

Section 36 in Township 11 North, Range 12 east, in Marana, one mile southeast of the proposed project. In March 2002, we completed consultation on a 100-acre residential development (Butterfly Mountain) adjacent to the project on the east. Butterfly Mountain will result in approximately 17% surface disturbance, but will retain potentially suitable nesting, foraging, and dispersal habitat.

While none of the above actions rose to the level of jeopardy, take of one or more pygmy-owls was anticipated on four of the above projects. It is clear that portions of the action area for this project are experiencing ongoing loss and fragmentation of habitat that may affect the pygmy-owl in northwest Tucson. This trend is expected to continue. Some of these activities have had a Federal nexus that resulted in section 7 consultation. As a result, we have been able to recommend modifications to activities that would block potential movement or dispersal corridors and permanently set aside either on-site or off-site conservation lands that are beneficial for the survival and recovery of the pygmy-owl. Since 1999, we are aware of nine projects within the action area, totaling approximately 900 acres, that have received Federal permits, but removed suitable pygmy-owl habitat without undergoing section 7 consultation.

As described above, portions of the action area are highly likely to continue to experience effects from urbanization. New housing construction, and its associated commercial developments and capital improvements, will continue to contribute to the loss and fragmentation of pygmy-owl habitat within the action area. Trends in urbanization and development within the action area are further described in more detail within the Cumulative Effects section of this biological opinion.

The Skyranch Property is situated south and east of a contiguous block of several thousand acres of State Trust land, including approximately 2,400 acres leased for pygmy-owl conservation purposes as part of the Dove Mountain development project. The portion of the action area defined by the effects of increased traffic on Tangerine Road and El Camino de Mañana lies adjacent to or within these State lands. Existing development and development proposals in the northern part of the action area are less extensive than in the southern part. However, State Trust lands may be sold or exchanged and could be used by future owners for development. The extent of development and the ability to address effects to pygmy-owls on State Trust lands depends on if they are sold or exchanged, the type of development proposed, and the presence of a Federal nexus. Presently, State Trust lands are being leased for grazing. Other activities (e.g., recreational off-road vehicle [ORV] use, shooting/target practice, hunting) also occur on these lands.

The Recovery Team has prepared a draft recovery plan dated January 2003 for the pygmy-owl (Draft Recovery Plan) and recommended Recovery Areas that they believe are necessary for the survival and recovery of the pygmy-owl in Arizona (USFWS 2003). Pertaining to this project, all areas are within a recommended Recovery Area. The team also has recommended specific areas within Recovery Areas for special management (i.e., SMAs) that are of the highest concern because: (1) they contain high concentrations of pygmy-owls, particularly nesting pygmy-owls, that are important sources of young pygmy-owls to increase the population; (2) pygmy-owl recovery is dependent on the availability of suitable habitat near breeding areas not currently known to have pygmy-owls where juvenile pygmy-owls can disperse into and successfully breed; and (3) they are threatened by rapid urban development or other immediate threats. Within CHU 3, two SMAs have been recommended by the Recovery Team: (1) Northwest

Tucson SMA B located generally north of Cortaro Farms Road, south of the 136000 N street alignment, east of Interstate 10, and west of La Cholla Blvd; and (2) Tortolita Fan SMA B containing major washes and upland corridors connecting the Northwest Tucson SMA to southern Pinal County. The project site falls within the Northwest Tucson SMA. The conservation measures that will be incorporated as part of this project are generally consistent with the applicable recommendations of the Draft Recovery Plan.

In 2003, only a small population (3 adults) of pygmy-owls were known in the action area. Of the known pygmy-owls, all are males, increasing the vulnerability of this population segment to extirpation. This emphasizes the need to maintain the ability of pygmy-owls within the action area to breed and disperse, particularly to enhance the pairing of known single males. Pygmy-owl use in the vicinity of this project has been documented since 1994. In 1994, a pair of pygmy-owls was located within one mile of the project, although no nest was confirmed. In 1995 and 1996, an unpaired pygmy-owl was detected in the same area as this pair. From 1996 through 2000, a nesting home range was located immediately adjacent to and overlapped the Skyranch Property's southern boundary. Another nesting pair was located approximately one mile south of the Skyranch Project in 1998. There are a total of 15 known pygmy-owl sites within 5 miles of the project. In 2000, a dispersing male pygmy-owl established a territory within the Skyranch Property boundaries. This pygmy-owl's transmitter was found on the ground within the Property in the fall of 2000. It is unknown whether the pygmy-owl removed the transmitter or if a predation event caused the transmitter to be removed. However, in the spring of 2001, there were a number of unconfirmed detections on and adjacent to the Skyranch Property. In 2003, there were portions of three active pygmy-owl home ranges within the action area. These sites vary from one mile to three miles from the project boundaries.

In addition to territorial pygmy-owls, a number of dispersing juveniles have been documented on or near the project. In 2000, the same year that the above-described individual established a territory, a second dispersing juvenile also spent time within the Property. It is unknown how long this individual stayed on the site, because the transmitter failed the day after it was located on the Skyranch Property. In 2001, a juvenile dispersed across the Skyranch Property, moving east to west. Also in 2001, a dispersing juvenile crossed east to west within a mile south of the project boundary.

From 1999 to 2002, CHU 3, including the action area, has accounted for approximately 30% of the documented adult pygmy-owls and 40% of the documented nests in Arizona (Abbate *et al.* 1999, 2000, AGFD 2002a). Given the substantial proportion of the statewide documented pygmy-owl population that this represents, we believe the pygmy-owl habitat and dispersal corridors found within the action area are important for the survival and recovery of the pygmy-owl statewide.

Effects of the Proposed Action

The residential housing portion of the proposed action, as described in the incidental take permit application and the Skyranch HCP, will result in the net, permanent loss of 103 to 113 acres (approximately 20% to 22% of the 512-acre Property) of Sonoran desertscrub vegetation which contributes to foraging, sheltering, movement, and dispersal habitat for pygmy-owls in the

project vicinity and has the potential to support nesting or territorial pygmy-owls. Off-site activities will impact another 6.035 acres (1.12 acres of which are vegetated). This project will also increase habitat fragmentation within the Property. The entire project site contains suitable habitat for the pygmy-owl, and it could provide for each of its life history components. The project site is near existing and proposed urban development. Construction of access roads and the improvement of existing roads will result in the introduction of new vehicle strike hazards and hydrologic changes within the fluvial features they cross. The total loss of habitat, and proposed critical habitat, is approximately 104.12 acres.

The action area intersects or lies within the Northwest Tucson SMA identified in the draft Recovery Plan. The Recovery Team recommends that areas within SMAs be conserved in a manner that promotes the successful breeding and dispersal of pygmy-owls. The specifics of how that is to be accomplished should rely upon the best available scientific data. Currently, the best information regarding the amount of development occurring in successfully breeding pygmy-owl home ranges comes from data being gathered by the AGFD. In home ranges (estimated to be 280 acres in size) where successful nests have been located, disturbance ranged from 16% to 54% with a mean of 33%. There are limitations to the data on which these numbers are based such as the small sample size, the limited number of years over which these data have been gathered, and the absence of data qualifying the disturbance types. However, it represents the best information upon which we can currently base our analysis. This project will result in the disturbance of approximately 20% to 22% of the Property.

Researchers in Arizona have found that pygmy-owls require habitat linkages, within and among territories for movement and dispersal, consisting of continuous cover or patches of trees and large shrubs spaced at regular intervals, to provide concealment and protection from predators and mobbing, as well as shade and cool temperatures (Abbate *et al.* 1999, Wilcox *et al.* 2000). Pygmy-owls, particularly juveniles, are susceptible to predation, weather extremes, human-related injury/mortality factors (e.g., cars, buildings, fences, domestic cats) and other mortality factors (mortality of juveniles is typically 50% or more for owls and other raptors). Therefore, it is essential to maintain habitat conditions that reduce their exposure to these threats and provide protection as they disperse from their natal areas. A high degree of cover throughout the landscape increases the likelihood of survivorship to the next breeding season. Limiting these mortality factors is critical, especially for small, depressed populations, such as pygmy-owls in Arizona.

Surveys for pygmy-owls have been conducted on the Property on an annual basis since 2000. Unconfirmed detections within the Property boundaries occurred in 2000, 2001, and 2002. As described in the Baseline for this project, this project includes or overlaps four known pygmy-owl home ranges, and a number of others are located within a few miles. However, none of the proposed project activities will occur within the known, active home ranges within the action area, and the Reserve will encompass the overlapping portions of the adjacent pygmy-owl home ranges. Therefore, we do not believe that this project will directly affect a known breeding site for the pygmy-owl. However, given the history of occupancy and use of the Property, it is anticipated that a pygmy-owl may reoccupy or establish a territory on or adjacent to the project site. Exeter has committed to measures that will avoid direct effects to pygmy-owls should this occur. These measures include ensuring noise disturbances will not cause the pygmy-owls to

abandon their nest or activity center, and conserving a sufficient amount and configuration of suitable habitat within their territory for it to remain viable for pygmy-owls. Should these measures be needed, Exeter has outlined a process through which the FWS would be contacted and consulted regarding the implementation of the conservation measures.

There is a reasonable likelihood that juvenile pygmy-owls may disperse through or onto the Property during construction of this development because: (1) there have been active nest sites adjacent to the project, as well as within the mean dispersal distance of this project; (2) the Property contains and will retain suitable dispersal corridors; and (3) dispersal has been documented on and in the immediate vicinity of the proposed project site. Dispersing pygmy-owls typically move greater distances during the dispersal period, ranging several miles and over wide areas before selecting a territory, where they will remain throughout the remainder of the fall and winter. The proposed residential development associated with this project will affect the configuration of dispersal habitat compared to existing conditions, but these effects have been reduced through the amount and configuration of open space conserved on-site. Based on the proximity of this project to a known dispersal pathway and the past history of pygmy-owl dispersal in relation to the project site, there is a reasonable likelihood that, over time, one or more dispersing juveniles will use this Property. Because of the inconsistent response of pygmy-owls to the survey protocol, the likelihood that AGFD will not monitor all pygmy-owls in northwest Tucson with telemetry, and the difficulty in defining owl use areas, we anticipate the possibility that a pygmy-owl could establish a territory on or adjacent to the Property without the FWS being aware of it. Exeter will incorporate measures to address this possibility, including ongoing surveys and cavity monitoring.

To support the movement of pygmy-owls through the project site and vicinity, and to partially offset adverse effects of the removal of dispersal and movement habitat in the project site, conserved open space (the Reserve) has been incorporated into the Property description. The Reserve will conserve approximately 409 acres of habitat throughout the Property, including protected dispersal corridors through the project area. It is reasonable to assume that pygmy-owls will be able to utilize these corridors to move through the project site, though the positioning of houses on the interfluvial areas between the channels may render the habitat less suitable and/or reduce movement perpendicular to the washes within the residential area. Impacts to jurisdictional waters will impact xeroriparian vegetation on and off-site of the project. This affects habitat connectivity and contributes to a reduction of pygmy-owl habitat.

If a pygmy-owl establishes a nest site on or within 600 m of the project, a 280-acre, circular home range will be delineated. If such a delineation affects the development area, compensation within the Reserve is allowed. Under this scenario, total ground disturbance may increase from 20% to 22%. However, this percentage of disturbance is still within the range of disturbance documented for occupied nesting sites in northwest Tucson, and is below the mean disturbance value of 33%.

Increased noise levels may appreciably disrupt normal behavior patterns such as dispersal. The construction of the residential development will be a relatively short-term event, with a foreseeable end in noise disturbance activities (within approximately five years, at most). It is unknown whether noise habituation occurs in some pygmy-owls as it does with other bird species, but dispersing

pygmy-owls would likely have no opportunity for habituation as the selection of habitat would be an immediate choice. Thus, harm or harassment of a dispersing juvenile is more likely than that of a resident pygmy-owl.

Although they are considered crepuscular/diurnal raptors, lighting used for construction purposes could disrupt normal behavior patterns such as roosting, calling, and feeding. Adherence to the guidelines outlined in section 7.2.1.1 of the EA/HCP will minimize the potential for this to occur.

Precluding the establishment of a territory due to construction activities and the screening of saguaro cavities also affects the ability of pygmy-owls to carry out normal breeding behavior. Impacts to prey availability as a result of project development affects the ability of pygmy-owls to feed. None of these effects are likely to cause lethal take, but certainly establish the need for an ITP.

There are also a number of potential indirect effects on pygmy-owls that could result from the development of this project. For example, mortality risks associated with pest control, pollution, collisions with cars, glass windows, and cat predation are often underestimated, although likely increasing in occurrence due to human population growth (Banks 1979, Klem 1979, Churcher and Lawton 1987). Even where human-related deaths are uncommon, they may still substantially affect populations of rare birds (Cartron *et al.* 2000a).

Because of the proximity of pygmy-owl sites to residential areas in northwest Tucson, these interactions may be a significant cause of pygmy-owl mortality there (Cartron *et al.* 2000b). It is expected that with this residential development, the number of cats will increase, resulting in increased possibility of predation of pygmy-owls and a reduction in the abundance of pygmy-owl prey species (e.g., lizards, birds) in this area, causing additional adverse effects to pygmy-owls.

Roads present a mortality hazard to foraging and dispersing pygmy-owls. The tree-to-tree flight pattern of the pygmy-owl can be disrupted by roads; the road's width may discourage the pygmy-owl from crossing, or pygmy-owls that do cross may be struck by passing automobiles. While connectivity is improved by retaining roads in a narrow state or incorporating vegetated medians into a wider road, the risk of vehicle mortality can never be eliminated. The project can reasonably be expected to generate a greater number of vehicle trips per day than currently occurs in the action area. This increase in vehicle trips (or a greater frequency of use) can therefore reasonably be expected to increase the probability that a pygmy-owl will be struck. Given the pygmy-owl's rarity and patchy distribution, and the fact that Tangerine Road, Camino de Mañana, Thornydale, and other major roadways in the action area cross documented pygmy-owl dispersal routes, any vehicle strike mortality could have serious adverse consequences for the long-term persistence of pygmy-owls in northwest Tucson because there are only three known individuals at this time.

Barratt (1995) studied the home range and predation of house cats within a mosaic of suburban and remnant grassland, woodland and open-forest habitats in Canberra, Australia. Of the 17 cats selected for radio collaring and telemetry work, 10 were house cats (the remainder were feral). It was found that 4 of the 10 house cats entered the woodlands. The home range sizes associated with these cats were discussed in the Environmental Baseline section, above. Barratt (1995) also

studied the prey items caught by a larger sample (214) of house cats for a 12-month period. Some 2,000 vertebrate prey items were documented, representing at least 67 species. House mice comprised 56% of the total, black rats 7%. Forty-seven species of birds (41 of which were native species), comprised 27% of the total catch. Reptiles represented 7% of the total, and amphibians 1%.

The results of Barratt's prey study inform two analyses for adverse effects on the pygmy-owl. House cats represent a direct threat to pygmy-owls. Pygmy-owl's small size is typical of many passerine birds, and they are within the size range of birds that may be taken by a house cat. It has been specifically documented in Texas that free-roaming cats have killed both adult and fledgling pygmy-owls. In northwest Tucson, two incidences of likely cat predation have been documented (AGFD 2003). Given the heavy representation of small rodents, birds, and reptiles noted by Barratt's study and the similar cross section of pygmy-owl prey recorded by Abbate *et al.* (1999), the FWS is concerned that house cats may actually compete for prey with the pygmy-owl. The substantial overlap in prey preference may secondarily expose the pygmy-owl to increased risk of predation (i.e., both animals are seeking the same prey), particularly in those moments when the pygmy-owl has seized a prey item larger than itself on the ground, which has been documented.

Exeter has specifically established guidelines and educational programs related to domestic cats. Access to the Reserve by free-ranging domestic pets is prohibited. Home owners will be educated and measures implemented to reduce and eliminate free roaming cats. The FWS has determined that this will minimize the risk of pygmy-owl mortality from house cats, though it will not likely eliminate it.

The proposed action will result in indirect effects to the surficial hydrology within and downstream of the project area. Residential development will increase the impervious area within the project area, thus altering the timing and magnitude of rainfall runoff. However, the low level of surface disturbance is expected to maintain the peak of the hydrograph within downstream drainages to a level commensurate with existing natural levels. The changed surficial hydrology on the interfluvial areas within the project area, however, can be expected to have an incremental effect on the sediment dynamics of the fluvial system. While the hydrograph may not be fundamentally altered, any retention of runoff on-site will likely retain sediment. Further, the construction of homes, yards, streets, and other anthropomorphic features are likely to incrementally lessen the supply of sediment to adjacent channels. Lastly, the potential increase in biomass within the channels may reduce their capacity to conduct floods, thus increasing the potential for lateral erosion. The subsequent placement of bank protection to arrest this potential erosion could confound any gains in vegetation. While the effects of these hydrologic and fluvial changes on the pygmy-owl are difficult to measure, they are of increasing concern to the FWS because they may contribute to landscape-scale, adverse changes to fluvial and interfluvial areas on the Tortolita Fan. This project will essentially leave all drainages intact, which should substantially reduce hydrological impacts.

An increased incidence of environmental contaminants is an indirect effect of the proposed action. The use of pesticides, in particular, could affect pygmy-owls indirectly by reducing prey species (e.g., insects, reptiles, birds) within their home ranges and directly if not used in a

controlled and targeted manner. The application of pesticides will be prohibited in the Reserve, helping to reduce, but not eliminate, effects in these areas.

The effects that non-directional and high-intensity lighting has on pygmy-owls are unknown. In residential areas, lighting is expected to increase; however, it is not quantified in the HCP. Of particular concern is high-intensity lighting in close proximity of pygmy-owl nests, activity centers, and movement corridors. Increased exposure to predation of adult pygmy-owls and fledglings may occur from great horned owls and other predators where bright lights are used near pygmy-owl sites. Exeter will use low-intensity and directional lighting to reduce the exposure of pygmy-owls to predation and effects on nesting and foraging in these areas. Thus, adverse effects would be substantially reduced or eliminated.

The proposed action could also cause short-term noise disturbance associated with construction and long-term noise disturbance and increased human activity. In the event a pygmy-owl is present, it is possible that such noise disturbance would affect the pygmy-owl directly by altering behavior, and indirectly through potential increases in predation, effects on prey species, etc. However, these effects have not been quantified during research on pygmy-owls. Exeter will implement the development constraints discussed in this document related to activities in proximity to pygmy-owls on and adjacent to the project. This should reduce the effects on pygmy-owls from noise and disturbance related to construction activities associated with this project.

Vegetation disturbance and activities that cause noise disturbances will be extremely limited within the conserved open space per the conservation measures set forth in the HCP and EA (e.g., ORV, jeep tours, organized events, pesticides, bright lights, and other activities). Because these activities are restricted within conserved open space corridors, the corridors should provide connectivity and cover for pygmy-owls and allow for movement through the project site, reducing the effects of the Skyranch Project on pygmy-owl movements.

Interrelated and Interdependent Actions

Interrelated activities are part of the proposed action that depend on the action for their justification, and interdependent activities have no independent utility apart from the action. No interrelated or interdependent actions have been identified in relation to this project. Direct and Indirect effects are discussed in the section above.

The proposed Skyranch Project will make incremental contributions to increased traffic. The roadway impact fees collected from the development will be used to improve existing roads and construct new ones in the project's region. These future actions are interrelated to the proposed action. These effects, however, are difficult to measure at this scale and are, at present, useful primarily in determining the scope of the project's effects and the action area.

Critical Habitat

The project area falls within the 73,958-acre Unit 3 of proposed critical habitat for the pygmy-owl (U.S. Fish and Wildlife Service 2002). All of the primary constituent elements defined in the

proposed rule designating critical habitat are found within the Property boundaries. Constituent elements containing components essential for nesting, rearing of young, roosting, sheltering, and dispersal will be removed in a portion of this area. These elements include Sonoran desert scrub and xeroriparian vegetation containing saguaro cactus, and large diameter trees, including ironwood, palo verde, mesquite, etc. These primary constituent elements will be eliminated on 104.12 acres within the project boundaries and as a result of off-site utility work. This equals approximately 0.14% of CHU 3. However, the actual percentage of critical habitat removed is somewhat higher since not all areas within the boundaries of critical habitat contain primary constituent elements (U.S. Fish and Wildlife Service 2002). Regardless of the quantity of habitat to be altered, the location of this project and the associated habitat impacts are consequential because of the proximity to known breeding and dispersal sites. The FWS Section 7 Consultation Handbook defines the destruction or adverse modification of critical habitat as “a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.” Based on the minimization and mitigation measures included in the HCP, IA, and ITP, the FWS does not believe effects to critical habitat rise to the level of destruction or adverse modification. Movement corridors will be maintained through the project site to allow for the movement of pygmy-owls through the area and the conserved open space should allow for continued use of the breeding territories. The conservation measures described above and in the HCP should maintain the function and viability of proposed CHU 3. In addition, these measures also are in conformance with the recovery objectives outlined in the draft pygmy-owl recovery plan, and would not, therefore, appreciably reduce the likelihood of recovery of the pygmy-owl.

Summary

Based on the current status of the pygmy-owl in Arizona, survival and recovery of the pygmy-owl will likely require not only protection of all known sites, but also the conservation of other areas not currently known to have nesting pygmy-owls. This can be measured at two spatial scales. At a large scale, connectivity is necessary among large blocks of suitable habitat that are either currently known to have nesting pygmy-owls or are important for recovery. This project contains measures to ensure that connectivity between large blocks of habitat are maintained. At a finer scale, the protection of habitat within the vicinity of known pygmy-owl sites for establishment of new sites and movement between them is also essential. The Northwest Tucson and Tortolita Fan SMAs account for a substantial proportion of the documented pygmy-owls and nests in Arizona. They also contain habitats not currently known to have nesting pygmy-owls that are likely important for the expansion of the population within the action area. Measures implemented as a part of this project will help to maintain habitat components contributing to fine-scale movements of pygmy-owls in the vicinity of known sites.

The development of the Sky Ranch Project will permanently remove approximately 104.12 acres of suitable nesting, foraging, and sheltering habitat. Movement and pygmy-owl dispersal corridors will also be affected in these areas. Direct effects to nesting and dispersal habitat have been minimized and addressed through the conservation measures outlined in this opinion and

the HCP. Indirect effects associated with the development are anticipated but are also addressed in the conservation measures outlined in the HCP and this opinion.

A maximum of 20% to 22% of the Property will have vegetation removed or disturbed, with approximately 78% to 80% of the area maintained as natural open space. The removal of this amount of pygmy-owl habitat in the vicinity of rapidly urbanizing northwest Tucson will result in effects on pygmy-owls in Arizona. Because the project proponents have incorporated a large area of undisturbed open space within the development; because management activities on these lands will be conducive to the conservation of the pygmy-owl in accordance with measures contained in the HCP and this opinion; and because of the extent of undisturbed or low-density disturbance present adjacent to the project boundaries, it is the FWS's opinion that the direct and indirect effects of this project on pygmy-owls and on pygmy-owl critical habitat are being addressed considering the best available science and the intent of recommendations made by the Recovery Team (USFWS 2003) for minimizing effects on the Arizona pygmy-owl population.

The effects of the proposed action will have the potential to "take" pygmy-owls in the form of harm and/or harassment. Exeter has included measures that will reduce the effects of this take below jeopardy. These measures include, but are not limited to:

- The incidental take authorized is non-lethal take;
- The incidental take authorized is for non-breeding individuals only;
- If a pygmy-owl is detected on or within 600 meters of the Skyranch Project, measures will be implemented to avoid habitat and activity disturbance effects;
- Incidental take is not cumulative, i.e. take not occurring in the specified year does not carry over to subsequent years;
- Overall habitat disturbance within the Skyranch Property is limited to 20% to 22%;
- The 399 to 409-acre Reserve will continue to contribute to pygmy-owl conservation within the action area; and
- Annual reporting requirements will insure that the actions proposed in the HCP and the Terms and Conditions of this opinion and the ITP are being implemented.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. As defined in the Environmental Baseline section, above, the action area for this project is defined using effects from roads, cats, and impacts to local hydrology. The action area thus overlaps or adjoins areas

subject to ongoing residential and commercial development pressures, and State, local, and private actions are expected to continue with various levels of development immediately to the north, northeast, south, and, to a lesser extent, east of the project site and elsewhere in the action area. Activities occurring within jurisdictional waters and wetlands of the U.S. require a section 404 permit under the CWA from the ACOE and, as a result, would be subject to future section 7 consultation and are not considered under cumulative effects. It must also be noted that avoidance of jurisdictional waters, including bridging over or jack-and-boring under them, may preclude the need obtain a 404 permit, thus removing a given project's Federal nexus.

In the past, any activity clearing five acres or more required a National Pollutant Discharge Elimination System (NPDES) section 402 permit under the CWA from the EPA. However, the NPDES program was transferred to the State of Arizona Department of Environmental Quality in 2002, and as a result, projects requiring such a permit no longer have a Federal nexus if the project does not require a permit from the ACOE. Many of these projects that were not formerly considered under cumulative effects because of their Federal nexus and section 7 process now need to be included in this analysis.

Some of these projects may address effects on pygmy-owls through another process (e.g. Habitat Conservation Planning under section 10 of the ESA) and could be excluded from this cumulative effects analysis, but such participation is voluntary. Aside from HCPs already in development, it is difficult, if not impossible, to predict which project proponents may choose to pursue an HCP.

Our analyses of trends in growth frame the scope of cumulative effects but do not necessarily define those actions that are reasonably certain to occur. There exist, however, certain incremental actions and approvals in the planning and zoning process that do contribute certainty to our analysis of cumulative effects. These actions include existing zoning, land-use designations within jurisdictional comprehensive plans, transportation plans, population projections, rezoning requests, development plans, plat submittals, and grading and building permit applications and approvals. It may be reasonably assumed that these actions, when considered in the context of recent trends, can give us a clear picture of the potential for cumulative effects that are reasonably certain to occur.

The general trend for the action area is for increasing residential development. The Town of Marana, which contains the action area, experienced 467% growth and Oro Valley 310% growth from 1990 to 1999; the Arizona State Department of Economic Security stated that Marana is one of the two fastest growing communities in Arizona (The Arizona Daily Star 2000b). Housing starts in the area have continued to increase with Marana issuing over 1,000 permits for the first time in 1999 (The Arizona Daily Star 2000a). More recently, from 2000 to 2002, total permits issued by Marana increased approximately 26% (PAG 2003). We have received, and continue to receive notification of numerous new housing subdivisions and commercial developments in this region as well. Pima County's population has grown from 666,000 in 1990 to estimates of at least 850,000 in 2000, or a 30% increase. This annual growth rate has varied from 15,000 to 30,000 persons each year, consuming at the present urban density approximately 7 to 10 square miles of Sonoran Desert each year (Pima County 2001). Not all of this growth occurs within the action area, nor are pygmy-owls affected by all growth. However, within Marana, growth increased 52% between 2000 and 2003, compared to only 8% for Pima County

as a whole (PAG 2003). As described above, portions of the action area are highly likely to continue to experience effects from urbanization. New housing construction, and its associated commercial developments and capital improvements, will continue to contribute to the loss and fragmentation of pygmy-owl habitat.

Within CHU 3, land ownership falls into two primary categories, private lands and State Trust lands. Much of the private land has already been developed, and the remaining undeveloped private lands can be expected to be developed. The State Land Department has identified Trust lands along Tangerine Road, Thornydale Road, and Camino de Mañana as suitable for commercial and medium density residential development (includes uses as intense as apartments) (ASLD 2000), indicating that State Trust Lands are likely to contribute to impacts to pygmy-owls and their habitat within the action area. However, there is also the potential for these lands to contribute to the conservation of important pygmy-owl habitats.

Private lands within the action area have jurisdictional approvals or designations (e.g., zoning, development plans, planning designations) that indicate continued development is reasonably certain to occur. We have searched the land use and zoning designations for Marana and Pima County within CHU 3. In light of documented trends and based on the existing zoning, submitted development plans or subdivision plats, transportation plans and development impact fee areas, we have determined that projects affecting pygmy-owls and pygmy-owl habitat, without a Federal nexus, are reasonably certain to occur at the following areas: Cortaro Road/Thornydale Road intersection, Tangerine Road/Thornydale Road intersection, Hardy Road/Thornydale Road intersection, Heritage Highlands development area, Tangerine Road/Camino de Oeste area, Camino de Mañana/Linda Vista area, and single-lot residential development throughout CHU 3. Proposed development would consist of commercial projects, residential subdivisions, and single-family residences.

There have been a number of recent lower-density developments proposed, such as Butterfly Mountain and Saguaro Canyon Ranch. In addition, some project proponents have chosen to cluster development at higher densities, leaving larger blocks of undisturbed desert and wash vegetation (Dove Mountain and Section 36). If implemented for future projects, both of these approaches would reduce the level of cumulative effects on pygmy-owls. Some areas have been down-planned (recent plans recommend lower density development than previous plans), but build out at these lower densities is dependent on a number of factors including market, existing zoning, and intentions of the landowner. Much of the private land in the area is zoned for low-density residential uses that would have reduced effects on the pygmy-owl. However, past development has often occurred on parcels that were rezoned from low-density zoning to a higher density. Based on projects with which we are familiar, this trend is likely to continue, but probably to a reduced extent.

A development currently under review in the Town of Marana, Tangerine Crossing, will cover approximately 300 acres and is located within two miles to the east of this project. Because ongoing dialogue between the owners of Tangerine Crossing and the FWS has ceased, it is unknown what effects this project may have on pygmy-owls and critical habitat, nor is it known what contributions this project may make toward conserving the pygmy-owl within the action area. However, communication with the Town of Marana, the authorizing municipality,

indicates this project will result in at least 50% ground disturbance. A number of project proponents have submitted development proposals to the FWS for the area west and southwest of the proposed project, but they have not entered formal consultation.

These cumulative effects will contribute to habitat fragmentation because most occur adjacent to roadways and will increase the linear extent of unsuitable habitat across the action area and CHU 3. The areas where cumulative effects are anticipated to occur support known breeding home ranges for the pygmy-owl, as well as dispersal habitat and pathways. These effects will not only reduce available pygmy-owl breeding habitat, but will also reduce habitat connectivity and the opportunity for pygmy-owl movements. Many of the outlined cumulative effects will occur in the southern and eastern portions of the CHU 3 in the vicinity of the Skyranch Project. However, because of the conservation measures outlined in the proposed action, the contribution of this action to ongoing cumulative effects is reduced.

Much of CHU 3 is already developed and fragmented, primarily in the area to the south of this project. As a result, any additional loss or fragmentation of pygmy-owl habitat may affect the species' ability to persist on the landscape. So while development trends, zoning, and planning are beginning to provide a scenario where cumulative effects may be reduced, any cumulative effects, particularly in the area north and west of the project site, may still have a considerable effect on the pygmy-owl. Many small, undeveloped parcels used primarily for single-family dwellings will not require a Federal permit or other Federal nexus and will continue to be built without section 7 consultation. This is particularly important in portions of CHU 3 due to the large number of undeveloped small parcels zoned as SR and low-density residential areas that, if developed, will further reduce the amount of suitable habitat, increase fragmentation, and degrade habitat conditions. As stated in the Environmental Baseline section, CHU 3 has supported one of the highest documented concentrations of pygmy-owls in Arizona.

Conclusion

After reviewing the current status of the pygmy-owl, the environmental baseline for the action area, the effects of the proposed residential development, and cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the pygmy-owl. The Skyranch Project does occur within proposed critical habitat for the pygmy-owl. However, the establishment of a Reserve on 78% to 80% of the Property, and the conservation measures identified in this BO and the HCP, help offset the effects of development, and it is the FWS's conference opinion that the proposed development is not likely to result in the destruction or adverse modification of proposed critical habitat. In making a determination the FWS considered the following:

- The status of the pygmy-owl in Arizona is tenuous. The number of adult pygmy-owls documented in Arizona has never exceeded 50 since regular survey and monitoring work began in 1993. In both 2002 and 2003, the number of known pygmy-owl nests in the State was three and four respectively, down from the highest number, 13, documented in 2001. Although sample size is low and the monitoring period short, available data suggests that there may be a declining trend in population that has somewhat corresponded with recent drought conditions. However, in and around the action area, drought should not have such a

marked effect due to artificial water sources, enhanced vegetation, and increased prey availability. However, numbers of known pygmy-owls within CHU 3 have declined from a high of 11 in 2000 to only 3 in 2003. Observations by researchers in Mexico may indicate a similar population decline just south of the U.S. Mexico border (A. Flesch, pers. comm).

- The CHU 3, including the action area, has been subject to rapid growth and urbanization. Existing natural habitats have been lost and fragmented. Growth in the Town of Marana, the primary jurisdiction within the action area, exceeded 400% during the past decade. Oro Valley, also within CHU 3, had 310% growth during that same time period. While some recent development projects have utilized lower housing densities or clustered development, many of the residential subdivisions being developed are high density (4 to 6 houses/acre). Many of the roads in the action area are slated for expansion or improvement, and at least one new highway interchange is under development. Some sites within CHU 3 have been designated for pygmy-owl conservation as a result of completed section 7 consultations.
- With the recent EPA transfer of the section 402 CWA NPDES program to the State of Arizona, the number of projects with a Federal nexus has been reduced within CHU 3. Single-family residence construction typically does not have a Federal nexus. Cumulative effects considered in our analysis include residential subdivisions, single-family residences, and commercial projects where zoning, development plans, subdivision plats, or impact fee assessment make them reasonably certain to occur, but no Federal nexus is anticipated. Areas where these cumulative effects are anticipated to occur include areas where pygmy-owl breeding home ranges and dispersal pathways have been documented. Cumulative effects are likely to continue to further fragment habitat.
- The Applicant has included a number of conservation measures that will meaningfully reduce the effects of the proposed action on pygmy-owls by 1) minimizing noise and vegetation disturbance if a pygmy-owl is detected on the project site prior to and/or after commencement of construction, reducing the extent of direct effects; 2) minimizing the indirect effects of this development (e.g., pet predation, pesticides, lighting, inappropriate activities within the conserved open space) on pygmy-owls; 3) limiting vegetation impacts to 20% to 22% of the Property ; 4) conserving 78% to 80% of the Property as natural open space; and 5) maintaining habitat connectivity by leaving the washes in a natural state.

In summary, the FWS's conclusions are based on the record of this consultation including the HCP, EA, IA, correspondence and meetings with the project proponents, and the information outlined in this BO. The pertinent points are summarize below:

1. The Property contains or is overlapped by four known pygmy-owl home ranges. However, no pygmy-owls are known to currently occupy any of these home ranges; therefore, the likelihood of lethal take is minimal. Effects to these home ranges have been minimized and mitigated through establishment of 78% to 80% of the Property as a habitat reserve that should allow for continued pygmy-owl breeding and dispersal.
2. Conservation measures will be implemented to mitigate to the maximum extent

practicable direct and indirect effects to the pygmy-owl in the face of declining pygmy-owl population status, baseline conditions characterized by reduced and fragmented habitat availability, and substantial cumulative effects. These measures include contingencies to avoid noise and habitat disturbance of any pygmy-owl that may establish a home range on or adjacent to the proposed project site.

3. Habitat disturbance will not exceed 104.12 acres (20% of the 512-acre Property [22% in the case of circumstances outlined in 7.2.1.1 of the HCP]; 0.142% of Critical Habitat Unit 3) and the disturbance will occur in a configuration that will still allow the potential for nesting and movement, therefore effects do not rise to the level of adverse modification of proposed critical habitat.
4. The effects of losing 104.12 acres of suitable habitat and the associated constituent elements will be partially minimized through the protection of approximately 409 acres within the Property (80% of the Property). These protected lands will remain undisturbed and be managed in a manner that will protect suitable habitat for the pygmy owl and contribute to its conservation. Take proposed is of four, non-breeding pygmy-owls and is non-lethal harm or harassment (2/year for the first year, 1 in the 2nd year, and 1 in the 3rd and 4th year).
5. Conserved open space will maintain connectivity within the Property and to adjacent suitable habitat areas offsite.
6. Conserved open space will provide habitat suitable for breeding, sheltering, feeding, and movement, partially offsetting adjacent and regional cumulative effects.
7. Annual reports will be submitted to us outlining the progress and extent of the implementation of pygmy-owl conservation measures and other actions outlined within the HCP and this opinion.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns, which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(3)(B)(4) and section 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action (in this case granting a permit to take the species in fulfillment of TE-063647-0) is not considered to be prohibited taking under the Act, provided

that such taking is in compliance with the terms and conditions of this incidental take statement.

Amount or Extent of Take Anticipated

Pygmy-owls have been documented using the vicinity of this project since 1994. The Skyranch Property contains or overlaps four known pygmy-owl home ranges, including one nesting home range. A total of 15 pygmy-owl home ranges are known within five miles of the project site. Three of these home ranges were occupied in 2003 and occurred from one to three miles from the project site. Dispersal routes have been documented on and adjacent to the Skyranch Property.

The proposed Skyranch HCP and its associated documents clearly identify anticipated impacts to pygmy-owls, their tie to anticipated take, and the measures that are necessary and appropriate to minimize these impacts. All conservation measures described in the HCP, together with the terms and conditions described in the section 10(a)(1)(B) permit issued with respect to the proposed HCP, are considered reasonable and prudent measures pursuant to 50 CFR '402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the Act to apply. If Exeter fails to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the proposed Skyranch HCP, associated reporting requirements, and provisions for disposition of dead or injured animals are as described in the HCP and its accompanying section 10(a)(1)(B) permit.

The FWS does not anticipate the proposed action will incidentally cause any take in the form death of a pygmy-owl. There are no currently active nesting or resident pygmy-owl sites or portions of their home range (within 600 meters) in the project site. However, because four home ranges occur within or overlap the Property, because of the use of the project vicinity by dispersing pygmy-owls, and because an active home range occurs within one mile of the project, we anticipate that, for the development phase of a project such as this, it is reasonably likely that a pygmy-owl home range could be reoccupied or established within or in the immediate vicinity of the project site (within 600 meters) by dispersing or resident pygmy-owls. A pygmy-owl reoccupying or establishing a home range could be affected by construction noise, dust, traffic, or other human activity in connection with the construction or utilization of the Skyranch Project. In the event an activity center is established on or immediately adjacent to the project site, the project description includes conservation measures such that the FWS does not anticipate that these activities will result in lethal take. However, it is anticipated that a dispersing juvenile or resident pygmy-owl could be subject to harm or harassment prior to the implementation of conservation measures due to the inconsistency of the survey protocol, limited nature of telemetry monitoring, and the difficulty of defining pygmy-owl use areas.

Generally, the FWS believes that the construction measures adopted by Exeter, as a result of their development of an HCP, will reduce any effects on pygmy-owls below lethal take. It is the FWS's opinion that any impacts to nesting pygmy-owls will be avoided through the conservation measures included as part of the proposed action. However, it is possible that non-lethal incidental take (in the form of harm or harassment) of a resident pygmy-owl could occur if a pygmy-owl establishes a territory within 600 meters of expected or ongoing development

activity and it is not detected through implementation of the survey and monitoring protocols. Because of the limited duration of the construction period and the low density of pygmy-owls within the action area, it is likely that the incidental take described above will be limited. Therefore, incidental take in the form of harassment or harm for up to four pygmy-owls, according to the following conditions as set forth in the HCP, IA, and ITP is anticipated for this project:

During the life of this Permit, as long as the Skyranch HCP is being properly implemented, the Permittee may, in carrying out the Permitted Activity, incidentally take within the Permit Area in the form of non-lethal harm or harassment, four non-breeding pygmy-owls as follows:

- Two (2) non breeding pygmy-owls the first year of construction
- One (1) non-breeding pygmy-owl the second year of construction
- One (1) non-breeding pygmy-owl the last 2 years of construction and for the remainder of the permit.

The above-anticipated take is not cumulative, but instead, what is likely to occur in the specific year or years identified above. Thus, for example, if two dispersing owls are not detected on the Property the first year, the Applicant will not be covered for any additional take other than what is stated above for subsequent years.

Effect of the take

In the accompanying biological and conference opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat. Specifically, Exeter has included measures that will reduce the effects of this take below jeopardy or adverse modification of critical habitat. These include, but are not limited to:

- The incidental take authorized is non-lethal take;
- The incidental take authorized is for non-breeding individuals only;
- If a pygmy-owl is detected on or within 600 meters of the Skyranch Project, measures will be implemented to avoid habitat and activity disturbance effects;
- Incidental take is not cumulative, i.e. take not occurring in the specified year does not carry over to subsequent years;
- Overall habitat disturbance within the Skyranch Property is limited to 20% to 22%;
- The 399 to 409-acre Reserve will continue to contribute to pygmy-owl conservation within the action area; and

- Annual reporting requirements will insure that the actions proposed in the HCP and the Terms and Conditions of the ITP are being implemented.

Reasonable and Prudent Measures

The mitigation, minimization, survey, monitoring, and reporting measures provided in the HCP, Implementing Agreement, and Terms and Conditions of the Incidental Take Permit are incorporated herein by reference as reasonable and prudent measures and terms and conditions. We find that they adequately offset the impacts of the incidental taking of the pygmy-owl resulting from the development of the Skyranch Project.

Disposition of Dead or Injured Listed Animals

Upon finding a dead or injured threatened or endangered animal, initial notification must be made to the FWS's Division of Law Enforcement, 2450 West Broadway Road, #113, Mesa, Arizona (480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animal species shall be submitted as soon as possible to the nearest FWS or AGFD office, educational, or research institutions (e.g., University of Arizona in Tucson) holding appropriate state and Federal permits.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any treated listed animal survive, the FWS should be contacted regarding the final disposition of the animal.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the ESA direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of our section 2(c) or 7(a)(1) responsibilities for the pygmy-owl. In furtherance of the purposes of the ESA, the FWS recommends implementing the following discretionary actions:

1. Conduct or fund studies using both monitoring and telemetry, to determine pygmy-owl habitat use patterns and relationships between owls and the human interface in northwest Tucson.

2. Continue to actively participate the implementation and monitoring of the Skyranch HCP and in regional planning efforts, such as Pima County's SDCP, the Town of Marana's HCP, the City of Tucson's HCP, and other conservation efforts for the pygmy-owl.
3. Assist in the implementation of recovery tasks identified in the draft pygmy-owl Recovery Plan.
4. Monitor the effectiveness of conservation measures associated with issuance of authorized permits.

REINITIATION NOTICE

This concludes intra-Service consultation for issuance of a permit authorizing incidental take under section 10(a)(1)(B) of the Act for proposed residential development within the 512-acre property known as Skyranch, in the Town of Marana, Pima County, Arizona. As provided in 50 CFR '402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) any incidental take not authorized herein occurs, (2) new information reveals effects of the agency action that may adversely affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a way that causes an effect to a listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by this action. In instances where any incidental take not authorized herein occurs, any operations causing such take must cease pending reinitiation.

Field Supervisor

Date

Deputy Regional Director

Date

cc: Army Corps of Engineers, Phoenix, AZ (Attn: Cindy Lester)
Exeter LXI L.L.C, Tucson, AZ
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ

LITERATURE CITED

- Abbate, D., A. Ditty, S. Richardson, and R. Olding. 1996. Cactus ferruginous pygmy-owl survey and nest monitoring in the Tucson Basin area, Arizona: 1996. Final Rep. Internal Enhance. #U95503, Arizona Game and Fish Dept., Phoenix.
- Abbate, D., S. Richardson, R. Wilcox, M. Terrio, and S. Belhumeur. 1999. Cactus ferruginous pygmy-owl investigations in Pima and Pinal counties, Arizona: 1997-1998. Arizona Game and Fish Dept. Reg. 5 Wildl. Prog., Phoenix.
- Abbate, D.J., W.S. Richardson, R.L. Wilcox, and S. Lantz. 2000. Cactus ferruginous pygmy-owl investigations in Pima and Pinal Counties, Arizona: 1999. Reg. V Wildl. Prog. Arizona Game and Fish Dept. Tucson.
- Abouhalder, F. 1992. Influence of livestock grazing on saguaro seedling establishment. Pp 57-61 in C.P. Stone and E.S. Bellantoni (eds.), Proceedings of the Symposium on Research in Saguaro National Monument, Tucson
- American Birding Association. 1993. Good birds from the hotline - April 1993. Winging It 5(5): 3.
- Arizona Game and Fish Department (AGFD). 2002a. Heritage management data system. Nongame Branch, Arizona Game and Fish Department, Phoenix.
- Arizona Game and Fish Department. 2002b. Summary of dispersal movements for six juvenile pygmy-owls radio-tracked in southern Arizona, 2000. Arizona Game and Fish Department, Phoenix, Arizona.
- Arizona Game and Fish Department (AGFD). 2003. E-mail communication on September 2, 2003. Draft 2 response to request for information on CFPO unpublished data. Email to Scott Richardson at Scott_Richardson@fws.gov.
- Arizona State Land Department (ASLD). 2000. Marana Planning Area: Arizona State Land Department Final Draft Land Use Concept. Prepared by Planners Ink for the Arizona State Land Department. 18 pp. + maps.
- Banks, R.C. 1979. Human-related mortality of birds in the United States. USDI, Fish and Wildl. Serv. Spec. Sci. Rep. Wildl. 215.
- Barratt, D.G. 1995. Predation and movement by house-based domestic cats *Felis catus* (L.) in suburban and rural habitats - preliminary findings. In Bennett A., Backhouse G., Clark T., Eds. People and nature conservation: perspectives on private land use and endangered species recovery. Transactions of the Royal Zoological Society of New South Wales. 181-187.
- Bendire, C.E. 1892. Life histories of North American birds with special reference to their

breeding habits and eggs. U.S. Nat. Mus. Spec. Bull. 1.

Benson, L. and R.A. Darrow. 1981. Trees and shrubs of the southwestern deserts. The University of Arizona Press. Tucson. 416 pp.

Boal, C. W. , R. W. Mannan, and K. S. Hudelson. 1998. Trichomoniasis in Cooper's hawks from Arizona. J. Wildl. Diseases 34:590-593.

Breninger, G.F. 1898. The ferruginous pygmy-owl. Osprey 2(10):128.

Brown, D.E. 1994. Biotic communities of the southwestern United States and northwestern Mexico. University of Utah Press, Salt Lake City, Utah. 342 pp.

Bureau of Transportation Statistics. 2003. World Wide Web inquiry of United States Department of Transportation 2001 National Household Travel Survey, daily trip file.

Burquez, A. and A. Martinez-Yrizar. 1997. Conservation and landscape transformation in Sonora, Mexico. Journal of the Southwest 39(3&4):370-398.

Burquez-Montijo, A., M. E. Miller, and A. Martinez-Yrizar. 2002. Mexican grasslands, thornscrub, and the transformation of the Sonoran Desert by invasive exotic buffelgrass (*Pennisetum ciliare*). In B. Tellman (ed) Invasive exotic species in the Sonoran region. The University of Arizona Press and The Arizona-Sonora Desert Museum.

Cartron, J. L. and D. M. Finch (tech. eds.). 2000. Ecology and conservation of the cactus ferruginous pygmy-owl in Arizona. RMRS-GTR-43. USDA Forest Serv., Rocky Mountain Res. Stat., Ogden, UT.

Cartron, J.E., S.H. Soleson, S. Russell, G.A. Proudfoot, and W.S. Richardson. 2000a. The ferruginous pygmy-owl in the tropics and at the northern end of its range: habitat relationships and requirements. Pp. 47-53 in J.E. Cartron and D.M. Finch (eds.), Ecology and conservation of the cactus ferruginous pygmy-owl in Arizona. RMRS-GTR-43. USDA For. Serv., Rocky Mountain Research Station, Ogden, UT.

Cartron, J.E., W.S. Richardson, and G.A. Proudfoot. 2000b. The cactus ferruginous pygmy-owl taxonomy, distribution, and Natural History. Pp. 5-15 in J.E. Cartron and D.M. Finch (eds.), Ecology and conservation of the cactus ferruginous pygmy-owl in Arizona. Gen. Tech. Rpt. RMRS-GTR-43. USDA, Forest Service, Rocky Mountain Research Station, Ogden, UT.

Churcher, P.B. and J.H. Lawton. 1987. Predation by domestic cats in an English village. J. Zool. London 212:439-455.

Davis, W.A. and S.M. Russell. 1984. Birds in southeastern Arizona. 2nd ed. Tucson Audubon Soc., Tucson, AZ.

Edwards, G.P., N. De Preu, B.J. Shakeshaft, I.V. Crealy, and R.M. Paltridge. 2001. Home range

and movements of male feral cats (*Felis catus*) in a semiarid woodland in central Australia. *Austral Ecology*. 26(1):93

Enriquez-Rocha, P., J.L. Rangel-Salazar, and D.W. Holt. 1993. Presence and distribution of Mexican owls: a review. *Journal of Raptor Research* 27: 154-160.

Fisher, A.K. 1893. The hawks and owls of the United States in their relation to agriculture. U.S. Gov. Print. Off., Washington DC.

Flesch, A.D. 1999. Cactus ferruginous pygmy-owl surveys and nest monitoring on and around the Buenos Aires National Wildlife Refuge, Altar Valley, Arizona. A report to USDI Fish and Wildl. Serv., FWS Coop. Agreement No. 1448-00002-99-G943. 21 pp.

Flesch, A.D. 2003a. Perch-site selection and spatial use by cactus ferruginous pygmy-owls in south-central Arizona. FWS Coop. Agreement No. 1448-00002-99-G943. *J. Raptor Res.* 37(2):151-157.

Flesch, A. 2003b. Distribution, abundance, and habitat of cactus ferruginous pygmy-owls in Sonora, Mexico. M.S. Thesis. University of Arizona, Tucson, AZ. 161 pp.

Flesch, A.D. and R.J. Steidl. 2000. Distribution, habitat and relative abundance of cactus ferruginous pygmy-owls in Sonora, Mexico: 2000 annual report. School of Renewable Natural Resources, University of Arizona, Tucson, Arizona.

Gilman, M.F. 1909. Some owls along the Gila River in Arizona. *Condor* 11:145-150.

Goltz, D., C. Murray, A. Agness, and P.C. Banko. 2001. Feral Cat Home Range, Habitat Utilization and Movements on Mauna Kea, Hawaii. Pacific Islands Ecosystem Research Center, U.S. Geological Survey-Biological Resources Division, Kilauea Field Station, Hawaii National Park, HI. Poster Presented at the 2001 Society for Conservation Biology Meeting, Hilo, HI.

Gryimek, H.C.B. (ed.). 1972. Gryimek's animal life encyclopedia. Van Nostrand Reinhold Co., New York.

Hanski, I.A. and M.E. Gilpin. 1991. Metapopulation dynamics: brief history and conceptual domain. In "Metapopulation dynamics: empirical and theoretical investigations" (M. Gilpin and I. Hanski, eds.), pp. 3-16. Academic Press, London.

Hanski, I.A. and M.E. Gilpin. 1997. Metapopulation biology: ecology, genetics and evolution. Academic Press, San Diego, California. 512 pp.

Hunter, W.C. 1988. Status of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) in the United States and Northern Mexico. Unpubl. rep., USDI Fish and Wildl. Serv., Phoenix, AZ.

- Hunter, W.C., R.D. Ohmart, and B.W. Anderson. 1987. Status of breeding riparian-obligate birds in southwestern riverine systems. Pp. 10-18 *in* Management and preservation of endangered birds in riparian ecosystems (S. A. Laymon, ed.). West. Birds 18:1-96.
- Hydrologic Engineering Center (HEC). 1992. Assessment of Structural Flood-Control Measures on Alluvial Fans. Prepared by the U.S. Army Corps of Engineers Hydrologic Engineering Center, Davis, California for the Federal Insurance Administration, Federal Emergency Management Agency, Washington, D.C. 76 pp. plus appendices.
- Johnsgard, P.A. 1988. North American owls. Smithsonian. Inst. Press, Washington D.C.
- Johnson, R.R., and L.T. Haight. 1985. Status of the ferruginous pygmy-owl in the southwestern United States. Abstracts, 103rd Stated Meeting of the American Ornithologists' Union, Arizona State University, Tempe, Arizona.
- Johnson, R.R., L.T. Haight, and J.M. Simpson. 1979. Owl populations and species status in the southwestern United States. Pp. 40-59 *in* Owls of the west: their ecology and conservation (P. Schaffer and S.M. Ehler, eds.). Proceed. Natl. Audubon Soc. Symposium, George Whittell Education Center, Tiburon, CA.
- Johnson, R.R., L.T. Haight, and J.M. Simpson. 1987. Endangered habitats versus endangered species: a management challenge. Pp. 89-96 *in* Management and preservation of endangered birds in riparian ecosystems (S. A. Laymon, ed.). West. Birds 18:1-96.
- Johnson, R.R., J.E. Cartron, L.T. Haight, R.B. Duncan, and K.J. Kingsley. 2003. Cactus Ferruginous Pygmy-owl in Arizona, 1872-1971. The Southwestern Naturalist. 48(3):389-401
- Karalus, K.E. and E.W. Eckert. 1974. The owls of North America: north of Mexico. Doubleday and Co., Inc., Garden City, New York. 278 pp.
- Klem, D.A. 1979. Biology of collisions between birds and windows. Ph.D. diss. Southern Illinois Univ.
- McLaughlin, S.P. and J.E. Bowers. 1982. Effects of wildfire on the Sonoran desert plant community. Ecology 61:246-24.
- Millsap, B.A. and R.R. Johnson. 1988. Ferruginous pygmy-owl. Pages 137-139 *in* Glinski, Richard L.; Pendleton, Beth Giron; Moss, Mary Beth; [and others], eds. Proceedings of the southwest raptor management symposium and workshop; 1986 May 21-24; Tucson, AZ. NWF Scientific and Technical Series No. 11. Washington, DC: National Wildlife Federation. 395 pp.
- Monson, G. and A.R. Phillips. 1981. Annotated checklist of the birds of Arizona. The University of Arizona Press, Tucson, Arizona. 240 pp.

- Monson, G. 1998. Ferruginous pygmy-owl. Pp. 159-161 *in* The raptors of Arizona (R. L. Glinski, ed.). Univ. of Arizona Press, Tucson.
- Oberholser, H.C. 1974. The bird life of Texas (E.B. Kincaid, Jr., ed.). Vol. I. Univ. of Texas Press, Austin.
- Olin, G. 1994. House in the sun. A natural history of the Sonoran Desert. Southwest Parks and Monuments Assoc. Tucson, AZ. 210 pp.
- O'Neil, A.W. 1990. Letter in Appendix B in Tewes, M.E.. 1993. Status of the ferruginous pygmy-owl in southern Texas and northeast Mexico. Proj. Rep. 2, Job 25, Texas Parks and Wildlife Dept. and Texas A&M Univ.-Kingsville.
- Pima Association of Governments (PAG). 2003. Permit and population statistics. www.pagnet.org/population/data/Est2001-2003.htm
- Phillips, A.R., J. Marshall, and G. Monson. 1964. The birds of Arizona. University of Arizona Press, Tucson, Arizona. 212 pp.
- Proudfoot, G.A. 1996. Natural history of the cactus ferruginous pygmy-owl. Master's Thesis, Texas A & M University, Kingsville.
- Proudfoot, G.A. and R.R. Johnson. 2000. Ferruginous Pygmy-Owl (*Glaucidium brasilianum*). *In* The Birds of North America, no. 498 (A. Poole and F. Gill, eds.). Birds of North America, Inc., Philadelphia, PA.
- Proudfoot, G.A. and A.A. Radomski. 1997. Absence of hematozoa from ferruginous pygmy-owls (*Glaucidium brasilianum*) in southern Texas. J. Helminthol. Soc. Wash. 64:154-156.
- Proudfoot, G.A. and R.D. Slack. 2001. Comparisons of ferruginous pygmy-owl mtDNA at local and international scales. Report to Charles H. Huckelberry, Pima County, Contract Agreement #07-30-T-125759-0399.
- Russell, S.M. and G. Monson. 1998. The birds of Sonora. Univ. of Arizona Press, Tucson.
- Seiler, A. 2001. Ecological effects of roads, a review. Grimsö Wildlife Research Station, Department of Conservation Biology, University of Agricultural Sciences, S-730-91. Riddarhyttan, Sweden. 40pp
- Smith, G.A. 2000. Recognition of significance of streamflow-dominated piedmont facies in extensional basins. Basin research 12:399-411.
- Swarth, H.S. 1914. A distributional list of the birds of Arizona. Cooper Ornithological Club, Hollywood, California.
- Tewes, M.E. 1995. Status of the ferruginous pygmy-owl in southern Texas and northeast

Mexico. Proj. Rep. 2, Job 25, Texas Parks and Wildl. Dept. and Texas A&M Univ.-Kingsville.

The Arizona Star. 2000a. Area home permits passed 7,000 in '99. Newspaper article. January 7, 2000.

The Arizona Star. 2000b. Suburb rush - newcomers piling into booming northwest. Newspaper article. April 2, 2000.

The Arizona Daily Star. 2003. Impact fees are rising in Arizona. Newspaper article. July 7, 2003.

The Northwest Explorer. 2003. OV Council approves new road fee. Newspaper article. October 22, 2003.

Tibbitts, T. 1996. Organ Pipe Cactus National Monument: Ferruginous pygmy-owl observations. Compiled by the Organ Pipe Cactus National Monument Natural Resources Management Department. Organ Pipe Cactus National Monument, Arizona. 11 pp.

Tropical Birds of the Border. 1994. Sixth annual Rio Grande birding festival. Harlingen, Texas.

University of Arizona. 1995. Records from the University of Arizona Bird Collection. Provided by T. Huels.

U.S. Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants; Determination of endangered status for the cactus ferruginous pygmy-owl in Arizona. Federal Register. 62:10730-10747.

U.S. Fish and Wildlife Service. 2002. Endangered and threatened wildlife and plants; Designation of critical habitat for the Arizona distinct population segment of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). Federal Register. 67:71032-71064

U.S. Fish and Wildlife Service. 2003. Draft cactus ferruginous pygmy-owl recovery plan. Albuquerque, New Mexico. 162 pp. + appendices.

Wilcox, R.L., W.S. Richardson, and D. Abbate. 1999. Habitat characteristics of occupied cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*) sites at the suburban/rural interface of north Tucson, Arizona. Arizona Game and Fish Dept., Phoenix. 30pp.

Wilcox, R.L., W.S. Richardson, D. Abbate. 2000. Habitat selection by cactus ferruginous pygmy owls in southern Arizona – preliminary results. Region V Wldlf. Prog. Rep. Arizona Game and Fish Dept., Tucson.